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ABSTRACT

In response to a Congressional request, the General Accounting Office (GAO) investigated drug use measurement by reporting the drug use patterns of targeted groups in three nationally prominent drug studies, assessing the methodological strengths and limitations of the studies, and developing recommendations for the improvement of drug prevalence estimates. The GAO examined the National Household Survey on Drug Abuse (NHSDA), the High School Senior Survey (HSSS), and the Drug Use Forecasting (DUF) study of booked arrestees. The NHSDA was found to be limited by the exclusion of groups at high risk for drug use, problematic measurement of heroin and cocaine use, and reliance on subject self-reports. HSSS excluded dropouts and absentees, yielded questionable estimates of drug use in non-white populations, and relied on self-reports. DUF employed both self-reports and the objective technique of urinalysis for assessing drug use, but its findings cannot be generalized. This document presents the report GAO sent to Congress concerning the evaluation of the three drug use studies and the recommendations for improving the studies. Following an executive summary, chapter 1 of the report provides an introduction to the GAO work. Chapter 2 describes the NHSDA, HSSS, and DUF studies and illustrates the drug use rates for marijuana, cocaine, and heroin and other opiates for different target groups. Chapter 3 describes the strengths and limitations of each of the three studies. Chapter 4 provides guidelines and recommendations for enhancing drug prevalence estimation techniques. (NB)

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United States General Accounting Office

GAO

Report to the Chairman, Committee on Government Operations, House of Representatives

June 1993

ED 360 604

DRUG USE MEASUREMENT

Strengths, Limitations, and Recommendations for Improvement

CG024989

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United States
General Accounting Office
Washington, D.C. 20548

Program Evaluation and
Methodology Division

B-252047

June 25, 1993

The Honorable John Conyers, Jr.
Chairman, Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

In your March 6, 1991, letter, you asked us to assess three prominent drug prevalence studies currently sponsored by the federal government. We were to include an examination of the degree of data concordance as well as an investigation of the strengths and limitations of each study. Additionally, you asked that we develop guidelines for improving drug prevalence estimates, particularly focusing on high-risk groups. The results of those inquiries are contained in this report.

As agreed with your office, we plan no further distribution of this report until 30 days from its date of issue, unless you publicly announce its contents earlier. We will then send copies to the Secretary of Health and Human Services, the Acting Director of the National Institute on Drug Abuse, the Acting Director of the National Institute of Justice, the Acting Deputy Director of the Office of Applied Studies of the Substance Abuse and Mental Health Services Administration, and to others who are interested. We will also make copies available to additional organizations and individuals upon request.

If you have any questions or would like additional information, please call me at (202) 512-2900 or Robert York, Director of Program Evaluation in Human Services Areas, at (202) 512-5885. Other major contributors to this report are listed in appendix II.

Sincerely yours,

Eleanor Chelimsky

Eleanor Chelimsky
Assistant Comptroller General

Executive Summary

Purpose

Is drug use declining in American households, schools, and correctional facilities? Are heroin prevalence rates on the rise? Are Americans still using marijuana, a "gateway" drug, in substantial numbers? National drug control policy requires answers to such questions. But in generating responses, it must also be asked: How valid are the data?

The Chairman of the House Committee on Government Operations asked GAO to investigate the issue of drug use measurement by (1) reporting the drug use patterns of targeted groups in three nationally prominent drug studies, (2) assessing the methodological strengths and limitations of each of these studies, and (3) developing recommendations for the improvement of drug prevalence estimates.

Background

GAO examined the National Household Survey on Drug Abuse (NHSDA, conducted since 1972), the High School Senior Survey (HSSS, conducted since 1975), and the Drug Use Forecasting (DUF) study of booked arrestees (begun in 1987). GAO evaluated the methodological strengths and limitations of these three studies in terms of the degree to which their research operations satisfied generally accepted criteria. GAO developed guidelines for improving drug prevalence estimates, focusing particularly on high-risk groups.

Results in Brief

NHSDA is a sophisticated study of drug use patterns and trends within a national sample of households but is limited by the exclusion of groups at high risk for drug use, problematic measurement of heroin and cocaine use, and reliance on subject self-reports. HSSS is also a sophisticated study but it excludes dropouts and absentees, yields questionable estimates of drug use in nonwhite populations, and relies on self-reports. Both these surveys therefore provide conservative estimates of drug use. DUF employs both self-reports and an objective technique—urinalysis—for assessing drug use but its findings cannot be generalized to booked arrestees in the geographic areas sampled.

GAO finds that drug prevalence estimates could be improved while money could be saved if NHSDA and HSSS were administered in alternate years rather than annually. GAO cites several ways of validating the two surveys and estimating the extent of underreporting. Promising new methodologies such as the analysis of hair samples deserve exploration as means to validate self-reports and determine drug use over an extended period of time. Expanding the subsamples of current surveys and conducting new studies aimed at hard-to-reach, high-risk groups should improve the coverage of underrepresented target populations.

Principal Findings

Reported Drug Use Rates in the Three Groups

There is no reason to assume that drug use rates will be similar among household, senior high school, and arrestee groups because these populations, the studies' data collection methodologies, and drug use risk levels vary. The rate of use of cocaine among booked arrestees in 1990 was 22 times higher than the past-month rate of use among high school seniors and 53 times higher than the past-month rate for households. Cocaine use across the total sample of booked arrestees remained stable, in excess of 40 percent, during each of the 4 years of study 1987-90.

All groups showed a decreasing use of marijuana. Between 1979 and 1990, the general household monthly rate declined by 60 percent; the high school senior monthly rate fell by 62 percent. During the period 1987-90, the arrestee marijuana rate decreased by 48 percent. Heroin use patterns are less clearly identified, given the methodological problems in obtaining access to these users.

Strengths and Limitations of the Three Studies

NHSDA employs a highly developed research design, emphasizing a national multistage probability sampling procedure. It is the longest running study of drug use in American households, covering persons age 12 and above. But GAO found methodological problems in estimating some of the national drug prevalence levels. For example, the number of past-year heroin users in the 1991 NHSDA was initially overestimated by 320,000; the number of frequent cocaine users ("taking the drug once a week or more") was overestimated by 230,000. Revised estimates indicate that there was not a rise in the number of frequent cocaine users between 1990 and 1991, as had been initially reported. Other technical problems GAO found in the estimation methodology, however, remain to be resolved, thereby casting doubt on the accuracy of published heroin and cocaine population estimates.

HSSS uses a national multistage probability sampling procedure for collecting drug use data on approximately 15,000 to 19,000 high school seniors each year. Between 120 and 140 public and private schools participate annually. The student refusal rate is less than 1 percent, but the study excludes absentees, constituting approximately 20 percent of the student body, and dropouts. The reliability of HSSS data for nonwhites is uncertain.

The DUF study has been implemented in 24 sites throughout the country. Using urinalysis procedures, DUF has been able to demonstrate high rates of cocaine use among booked arrestees. According to DUF, arrestees seriously underreported cocaine use by more than 50 percent in 20 sites, calling into question the utility of the self-report procedure for this population group. But DUF's results cannot be generalized to either the booking facility sites it samples or the cities indicated in DUF's publications. Comparability across DUF sites is compromised, and convenience sampling procedures inhibit the use of statistical tests, making it difficult to determine whether changes in drug use patterns are meaningful or related to chance alone.

Changes in Scope

GAO's findings do not support the utility of collecting national prevalence survey data annually on the various forms of substance abuse among high school students and the general population. There are five reasons for this: the present survey indicators (NHSDA and HSSS) have generally shown minimal variations in drug prevalence rates between survey administrations; the validity of self-reported data is questionable; frequent heroin and cocaine users are not effectively covered; resources could be more effectively applied to other drug-use measurement activity; and NHSDA costs are particularly high.

Adequate state-level drug use data sets are necessary to assist local policymakers in the planning and evaluation process. But GAO finds that proposals to expand NHSDA to the state level are both costly (estimated to be $110 million) and potentially duplicative of other funded studies seeking to determine drug prevalence estimates.

Recommendations

To reduce costs with no meaningful loss of information, GAO recommends to the Congress that part A of title V of the Public Health Service Act be amended to provide that the Secretary of Health and Human Services collect survey data only biennially, rather than each year, on the national prevalence of the various forms of substance abuse among high school students and among the general population. But if local or regional indicators portend an increase in drug use, then the Secretary should have the authority to initiate new or augment current studies to determine the nature and degree of the problem.

GAO also recommends that the Secretary of Health and Human Services

- develop or improve supplementary data sources to more appropriately determine heroin and cocaine prevalence patterns and trends;
- design and conduct a systematic program for the study of drug use prevalence rates among underrepresented, high-risk groups;
- give high priority to validating self-reports of the use of illicit drugs, particularly focusing on objective techniques such as hair testing;
- incorporate methodological design changes into HSSS so that nonwhite individuals are adequately sampled;
- retain the current design of NHSDA to provide national estimates only (and not expand the design to provide state-level estimates of drug use).

GAO recommends that the Director of the National Institute of Justice

- review the practicality of improving the DUF design, such as by using a standardized methodology across sites, and
- give priority to creating a DUF arrestee data base that can be generalized to booked arrestees in the geographic areas surveyed.

Agency Comments

GAO discussed the results of its work, including facts and conclusions, with responsible agency officials at the National Institute on Drug Abuse (NIDA), Substance Abuse and Mental Health Services Administration (SAMHSA), and National Institute of Justice (NIJ) and incorporated their comments where appropriate. While the officials generally agreed with GAO's review of the studies' data and methods, they did not agree with all conclusions and recommendations for improvement. NIDA officials raised issues related to hair testing. SAMHSA discussed the frequency of NHSDA administration. NIJ was particularly concerned about issues of generalizability and standardization of the DUF data. Details of these agency comments and GAO responses are provided at the conclusion of chapter 4.

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Abbreviations

BJA	Bureau of Justice Assistance
CEWG	Community Epidemiology Work Group
CSAT	Center for Substance Abuse Treatment
DC*MADS	Washington D.C. Metropolitan Area Drug Study
DAWN	Drug Abuse Warning Network
DUF	Drug Use Forecasting
DUI	Driving under the influence
DWI	Driving while intoxicated
EMIT	Enzyme multiplied immunoassay technique
GAO	General Accounting Office
GC/MS	Gas chromatography/mass spectrometry
HHS	Health and Human Services
HSSS	High School Senior Survey
NHSDA	National Household Survey on Drug Abuse
NIDA	National Institute on Drug Abuse
NIJ	National Institute of Justice
ONDCP	Office of National Drug Control Policy
PSU	Primary sampling unit
RIA	Radioimmunoassay
SAMHSA	Substance Abuse and Mental Health Services Administration
SSDP	State Systems Development Program
TLC	Thin layer chromatography
UCR	Uniform Crime Reports

Introduction

Policymakers, researchers, and planners must have accurate drug use information if they are to properly assess the nation's current drug prevalence patterns and trends, substance abuse clinical resource needs, criminal justice intervention initiatives, and overall success in winning the war on drugs.

The quality of data on drug use, however, can be constrained by methodological problems, available research technology, and environmental and budgetary limitations. Since millions of dollars are spent on drug prevalence studies, it is important to evaluate the current state of drug use measurement practices—as well as determine the utility of reported results and distinguish positive directions for the enhancement of the field—within a cost feasibility context.

This type of evaluation is particularly relevant given the passage of the Anti-Drug Abuse Act of 1988 (Public Law 100-690), which requires that the extent of alcohol and drug abuse be determined every year among high school students and the general population and that annual studies of substance abuse be conducted within major metropolitan areas. While it is critical that drug use data be collected regularly, the mandate of this legislation departs from previous general population data collection frequency protocols. The benefits of obtaining more frequent data must be weighed against the added costs, validity, and utility of the information to be gained and alternatives that might otherwise be pursued.

Objectives, Scope, and Methodology

The administration's National Drug Control Strategy incorporates three studies that have been focal points of congressional hearings on drug abuse estimation. (1) The National Commission on Marijuana and Drug Abuse sponsored the initiation of the National Household Survey on Drug Abuse (NHSDA) in 1971-72. The National Institute on Drug Abuse (NIDA) sponsored NHSDA from 1974 through September 1992. The Substance Abuse and Mental Health Services Administration (SAMHSA) has sponsored NHSDA since October 1, 1992. (2) NIDA has also sponsored the Monitoring the Future survey of high school seniors continuously since 1975. (3) The National Institute of Justice (NIJ)—with cofunding from the Bureau of Justice Assistance (BJA)—has been conducting a Drug Use Forecasting (DUF) study of booked arrestees in metropolitan areas for the past 6 years. In his request letter, the Chairman of the House Committee on Government Operations singled out these studies for specific consideration.

We were asked to address three objectives:

1. to report the drug use patterns of targeted groups in the National Household Survey on Drug Abuse, Monitoring the Future, and Drug Use Forecasting studies;

2. to investigate the strengths and limitations of each of these studies;

3. to develop guidelines for improving drug prevalence estimates, with special attention to improving data on high-risk groups.

The Monitoring the Future study has five components: a High School Senior Survey (HSSS), a Young Adult follow-up, surveys of eighth and tenth grade students, and a school dropout survey. Since the latter four have only recently been implemented, and since HSSS continues to receive the most attention, we focused on it.

By agreement with the Committee, then, we examined NHSDA, HSSS, and DUF; excluded other existing studies that include drug use components; and focused exclusively on the use of illicit drugs. We did not consider methodological issues and findings relevant to alcohol, tobacco, and prescription or over-the-counter drugs.

Overview of the Three Drug Use Studies

We begin with an overview of each of the three studies so as to familiarize readers with (1) the purposes of each study, (2) the specific population groups targeted, (3) administration frequency, (4) sampling procedure, (5) data collection method, (6) sample size, and (7) costs.

The National Household Survey on Drug Abuse

NHSDA is the only drug use data collection project being conducted on a cross-section of American households. Its primary purpose is to provide current information on national drug use patterns and trends. Between 1972 and 1990, NHSDA was generally conducted every 2 to 3 years. Since 1990, it has been conducted annually.

NHSDA uses a multistage probability sample. First, the principal investigators select primary sampling units, or PSUs—that is, standard metropolitan statistical areas, counties, and cities that satisfy Bureau of the Census requirements. Then they choose area segments within these PSUs (aggregations of blocks and enumeration districts containing a minimum of 40 occupied housing units) followed by particular household units. Finally, they devise strategies for the selection of specific individuals to interview.

Since 1972, the persons who are eligible for participation in the survey have been ongoing rather than transient members of households, at least 12 years of age, who maintain residence in the continental United States. NHSDA included Alaska and Hawaii starting in 1991.

Until recently, NHSDA excluded the homeless and individuals in prisons, treatment centers, college dormitories, military installations, nursing homes, and single room hotels. The exclusion criteria were partially relaxed in 1991 to include the sheltered homeless and individuals living on military installations and in college dormitories.

The survey relies entirely on anonymous self-reports of drug use. The sample size expanded from 5,624 in 1982 to 9,259 in 1990 and again, more than threefold in 1991, to 32,594 so as to include both a national sampling of households and an oversampling in six cities, meeting the requirements of the Anti-Drug Abuse Act.

NHSDA estimates national drug prevalence rates from these sample data and typically publishes them in terms of drug use during the past month, past year, and lifetime, categorizing them by demographic group and geographic setting.

Costs have risen with the expansion of the survey. In 1988, the total cost of conducting NHSDA was approximately $2.8 million. This rose to about $4.0 million in 1990 and $11.5 million in 1991. The present contractor estimates a cost of $12.6 million for 1993.

The High School Senior Survey

HSSS is an annual drug use assessment of 15,000 to 19,000 high school seniors attending both public and private schools throughout the coterminous United States. The study's primary purposes are to generate data on current high school drug use patterns and trends, determine who is at greatest risk for specific types of drugs, understand what influences drug use change, and clarify how lifestyle, value orientation, and social environment are associated with drug use.

Like NHSDA, HSSS involves a multistage probability sample. It employs a random selection of school sites based on a probability proportionate to the number of students enrolled. Since inception, approximately 120 to 140 schools have been invited to participate each year. If a school chooses not to participate, it is replaced with another school of the same size in the same district. Where more than one school satisfies the criteria, HSSS selects randomly. Where no school satisfies the criteria in the same district, or no school is willing to participate, another school is picked outside the district but within the same PSU.

HSSS selects only students present during survey administration. It excludes from participation dropouts, absentees, and those otherwise unavailable (for example, truants from the class period and individuals in the infirmary).

HSSS also depends upon self-reports. But unlike NHSDA and DUF, HSSS requests the student's name and address on the survey form, along with the name and address of a contact person, in order to conduct longitudinal follow-up studies after high school (the Young Adult Survey). Students are guaranteed protection against the release of individually identifiable data.

Study costs have been rather consistent over the last few years. During the funding period August 1989 to July 1990, the total cost was approximately $1.7 million. During the following 2 years, the total cost remained stable at about $1.8 million and $2.0 million, respectively. Direct costs for August 1992 to July 1997 are projected to amount to no more than $1.5 million annually. Indirect costs remain to be negotiated.

Drug Use Forecasting

DUF consists of a series of local studies rather than one nationally based study of drug use among booked arrestees. The primary intent is to determine the types of drugs being used in specified jurisdictions, the levels of use, and changing patterns over time. In sponsoring the data collection effort, NIJ intended to assist local governments and law enforcement agencies to more effectively plan and allocate resources for fighting drug abuse and to help design necessary treatment programs and related services.

According to an official involved in site recruitment, NIJ sought to obtain the participation of the larger cities that have central booking facilities, where feasible and cost-effective DUF programs could be implemented, and preferably where other local indicators of drug use data were already being collected. As of 1990, 24 sites were participating in the program: Atlanta, Birmingham, Chicago, Cleveland, Dallas, Denver, Detroit, Fort Lauderdale, Houston, Indianapolis, Kansas City (Missouri), Los Angeles, Manhattan (New York), Miami, New Orleans, Omaha, Philadelphia, Phoenix, Portland (Oregon), St. Louis, San Antonio, San Diego, San Jose, and Washington, D.C.

DUF has been administered quarterly since 1987. For about 14 days each quarter, NIJ-contracted organizations seek to obtain the participation of about 225 adult male arrestees and 100 adult female arrestees per site (some sites are also contracted to obtain data from booked juveniles). Unlike NHSDA and HSSS, DUF uses convenience sampling.

Also unlike the other studies, DUF supplements self-reports with objective measurement. The arrestees provide both drug use self-reports and urine specimens. A positive urinalysis screen is determined by an enzyme multiplied immunoassay technique (EMIT), the latest, most widely accepted screening procedure for urine assays. A confirmatory test (that is, gas chromatography) is conducted when the EMIT screen is positive for amphetamines, since over-the-counter drug use can precipitate a false positive.

The cost of the DUF program amounted to $1.74 million in fiscal year 1989. This decreased somewhat in fiscal year 1990, to $1.54 million, but rose to $3.02 million in 1991, largely because of an increase in site funding.

Table 1.1 provides an overview of NHSDA, HSSS, and DUF.

Table 1.1: Summary of NHSDA, HSSS, and DUF

Survey	Administration frequency	Sampling procedure	Data collection method	Sample size	Cost[a]
NHSDA	2-3 yrs (1972-88); annually from 1990	Multistage probability sample	Self-report	1990: 9,259 1991: 32,594	1990: $4.0 1991: $11.5
HSSS	Annually	Multistage probability sample	Self-report	15,000-19,000 per year	1990: $1.8 1991: $2.0
DUF	Quarterly	Convenience Sample	Urinalysis and self-report	225 males per quarter per site; 100 females per quarter per site (24 sites in 1990)	1990: $1.5 1991: $3.0

[a] Dollars are in millions.

Objective 1

Under our first objective—reporting the drug use of targeted groups in three nationally prominent drug use studies— we focused on three major drug types: (1) marijuana, the hypnotic and most frequently used illicit drug in American culture; (2) cocaine, the addicting stimulant of focal importance in drug trafficking and crime; and (3) heroin and other opiates, for which there is renewed concern about rising use.

For each drug type, we examined data on general household, high school senior, and booked arrestee drug use rates to answer the following questions:

- What is the overall group prevalence rate for each drug type?
- Do prevalence rates vary by demographic subgroup?
- Do prevalence rates vary by geographic setting?
- Have drug use patterns substantially changed over time?

To answer these questions, we obtained NHSDA, HSSS, and DUF public use data and written reports through 1990 from each of the sponsoring agencies. We obtained supplementary statistical and methodological background information from the current NHSDA contractor (the Research Triangle Institute), the HSSS grantee (the Institute for Social Research, University of Michigan), and relevant DUF sites.

Objective 2

We assessed the strengths and limitations of NHSDA, HSSS, and DUF to determine whether their study research operations satisfied research protocol standards. We evaluated the technical quality of each of the three studies in terms of specification of study intent, sampling design and measurement, data collection, and analysis and reporting procedures. Our evaluation covered each of these four areas and their 24 components, obtained from the social science research methods literature. (See table 1.2.)

Table 1.2: Criteria for Our Evaluation of Study Quality

Survey operation	Assessment criteria
Specification of study intent	Clearly delimited area of study
	Relevant target populations identified
	Explicitly stated and defined objectives
Sampling design and measurement	Appropriate sampling strategy
	Sufficient sample size
	Adequate inclusion and exclusion criteria
	Sound subject recruitment procedures
	Appropriate oversampling procedures
	Appropriate site selection protocol
	Valid, reliable measurement instruments
	Feasible strategy for the protection of subjects' privacy
Data collection	Adequate field work preparation
	Experienced data collection investigators
	Reduced potential for bias
	Successful follow-up contact procedures
	Relatively high response rate
Analysis and reporting	Experienced project managers
	Adequate disclosure of respondent characteristics
	Utility of self-report and objective measures
	Appropriate management of missing data
	Sound weighting and imputation procedures
	Appropriate statistical techniques
	Comparability of data and reported text
	Adequate disclosure of study omissions and limitations

Although we detail many limitations of these data in chapter 3 and cannot attest to the accuracy of the drug use data that agency sponsors and principal investigators provided, we believe that observed trends (as reported in chapter 2) are likely to be genuine even if some of the absolute figures may be underreported.

We used multiple sources to conduct the evaluation. We visited the NHSDA and HSSS contractors and three DUF field facilities, conducted interviews with agency officials, and reviewed the literature relevant to these surveys and the general field of substance abuse (see the bibliography).

Objective 3

To derive areas of emphasis for improvement, we used our evaluation of the strengths and limitations of each of the three studies, our reviews of the drug prevalence literature, meetings with agency sponsors and project managers, and interviews with 11 prominent researchers in the drug prevalence field. We focused on developing guidelines and recommendations for work in (1) enhancing NHSDA, HSSS, and DUF and (2) exploring the utility of new methods for reaching population groups at high risk for drug abuse.

Enhancing the NHSDA, HSSS, and DUF Studies

Adopting a Multifaceted Approach. In our discussion of study enhancements, we gave priority to the research concerns that could contaminate the validity and reliability of the data and jeopardize the ability to generalize from results. We focused on such issues as the use of an appropriate sampling design strategy, attainment of sufficient sample size, the adoption of appropriate inclusion and exclusion criteria, the relevance of the site selection protocol, the use of field-tested measurement instruments, the adoption of appropriate weighting procedures, and the use of relevant imputation procedures. We based our recommendations upon an assessment of the studies' methodological and statistical procedures, a review of the drug use literature, and discussions with agency sponsors and user groups.

Validating the Self-Report Technique. To explore methods that might either confirm or refute the self-report data, we examined objective drug testing procedures and subject self-reports of response accuracy.

To examine the economic and technological feasibility of conducting objective tests in the general community, we reviewed the recent drug testing literature, interviewed (either face-to-face or by telephone) laboratory and research experts, and assessed the laboratory costs of implementing the necessary screening and confirmatory procedures.

We assessed subject self-reports of response accuracy by evaluating the HSSS "honesty" data collected over the past 15 years. Since 1975, participating senior students have been asked to identify whether they would accurately report their use of cocaine, heroin, and amphetamines on the survey form if they had indeed used these substances. We compared the replies to actual student drug use responses, to assess potential drug underreporting or overreporting.

Assessing New Methodologies for Reaching High-Risk Groups

Even with enhancements, current NHSDA, HSSS, and DUF protocols may not be adequate for measuring drug use in high-risk groups. Therefore, we also examined the utility of new, alternative methodological approaches for studying drug use patterns and trends within these groups.

We reviewed the substance abuse literature and spoke with researchers and agency administrators. We identified a limited number of new methodological studies as being specifically adaptable to high-risk populations. We evaluated the current status of the work (for example, the Washington D.C. Metropolitan Area Drug Study, or DC*MADS, and the Monitoring the Future Dropout Study), assessed projected costs, and determined transferability to other jurisdictions.

The Strengths and Limitations of This Report

The major strengths of our report are that we provide a comprehensive, systematic evaluation of the strengths and limitations of the NHSDA, HSSS, and DUF studies and that we were mindful of cost and technological feasibility considerations—along with research needs—in generating recommendations for enhancing drug prevalence estimation procedures. We also present promising methods to remedy weaknesses in current measurement procedures.

The limitations of our report are threefold. First, the findings we report are based on three specific target groups, those deemed of interest by the requesting congressional committee. Had we compared surveys of other specific population groups (for example, in drug treatment facilities, correctional institutions, and the armed forces), our drug use findings might have been different.

Second, our constrained resources meant that we could visit only 3 of the 24 1987-90 DUF sites: New York, Philadelphia, and Washington, D.C. It would have been useful to observe additional DUF booking facilities so as to better assess the factors contributing to the outcomes observed.

Third, two of the prominent studies of drug use information on high-risk groups are in their early stages of implementation. Viewed a year or two from now, they might prove either more or less promising than they seem now as methodological strategies.

Agency Comments

Oral agency comments with our responses are reported at the conclusion of chapter 4.

Organization of the Report

Chapter 2 describes the NHSDA, HSSS, and DUF studies and illustrates the drug use rates for marijuana, cocaine, and heroin and other opiates for different target groups (objective 1). Chapter 3 describes the strengths and limitations of each of these three studies (objective 2). Chapter 4 provides guidelines and recommendations for enhancing drug prevalence estimation techniques (objective 3).

Measuring Drug Use Among Targeted Groups

In this chapter, we discuss current patterns and trends of marijuana, cocaine, and heroin and other opiate (for example, codeine and morphine) use by the general household population, high school seniors, and booked arrestees as reported in NHSDA, HSSS, and DUF. We look at four key questions:

- What is the overall group prevalence rate for each drug type?
- Do prevalence rates vary by demographic group?
- Do prevalence rates vary by geographic setting?
- Have drug use patterns substantially changed over time?

Such analyses can serve many purposes. From a results perspective, they can help policymakers identify the target populations and geographic areas with high rates of drug use and determine the degree to which drug use is decreasing (or increasing or remaining stable) among various subgroups within the United States. From a data management and methodological perspective, such analyses can help demonstrate current gaps in our data collection systems, degrees of standardization between and within studies, and variations in definition that can affect the comparison of results.

We discuss each of the four questions first with regard to marijuana, then cocaine, and finally heroin and other opiates. As will be demonstrated, households, high school seniors, and booked arrestees are most consistent in terms of marijuana use and most problematic in terms of determining heroin and other opiate use.[1]

However, it should be noted that there is no reason to expect similar rates of drug use in these three groups. The populations, the data collection methodologies, and drug use risks all vary. We would expect arrestees to have the highest overall rates of drug use owing to their higher risk status on both social and psychological factors, seniors to be experimenting with the "gateway" drug marijuana, and the general population to be manifesting the lowest overall rates.

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[1] In these target group assessments, we use arrestee urinalysis rates rather than self-reports because of the sizable underestimation in self-reported data evident among DUF booked arrestees (see chapter 3). The urinalysis detection period for cocaine is approximately 12-72 hours; for heroin and other opiates, approximately 2-4 days; for marijuana, up to 30 days. Household and high school senior findings derive entirely from subject self-reports.

Marijuana

Overall Rates

Table 2.1 shows the overall marijuana use rates across each of the three groups.[2] Since DUF did not collect arrestee data on a multisite basis until 1987, the analysis covers 1987-90. Figure 2.1 provides past-month and past-year drug use data for households and high school seniors from 1974 to 1990.[3]

Table 2.1: Overall Marijuana Use Rates

	NHSDA		HSSS		
Year	**Past month**	**Past year**	**Past month**	**Past year**	**DUF**
1987	[a]	[a]	21.0%	36.3%	36.2%
1988	5.9%	10.6%	18.0	33.1	36.3
1989	[a]	[a]	16.7	29.6	24.3
1990	5.1	10.2	14.0	27.0	19.0

[a] Survey not conducted.

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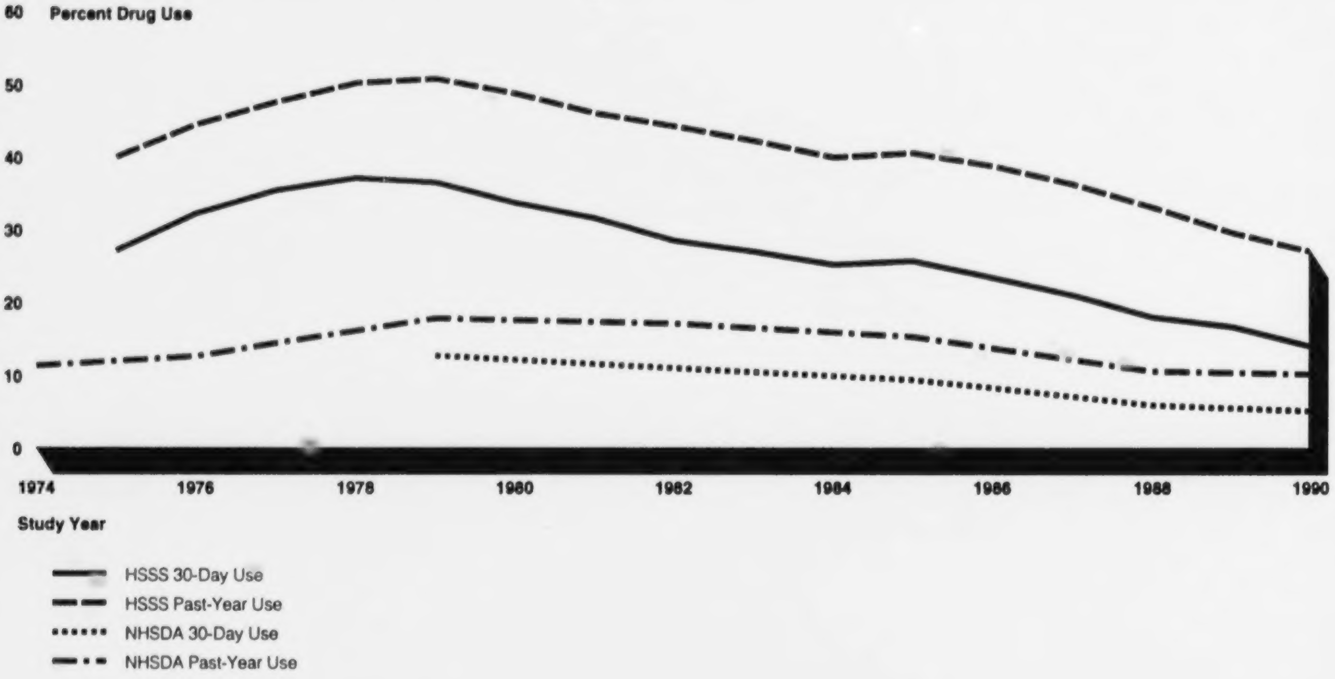
[2] Arrestee "overall drug use rates" provide a global perspective of the drug use rate across all booked arrestees participating in the DUF study, for any given year. However, this overall rate may mask some sizable differences between sites and between demographic subgroups (for example, cocaine rates for Philadelphia and New York may be higher than those for Indianapolis and San Antonio; 18-25-year-olds may be greater users of marijuana than those age 35 and older). Area and subgroup differences are also considered in this chapter.

[3] Surveys sometimes ask about drugs in slightly different ways. DUF arrestees have reported only marijuana use. High school seniors have reported marijuana or hashish use. The NHSDA general household population reported only marijuana use in 1972-77, marijuana and hashish use in 1982, and marijuana or hashish use in 1985-90. Since hashish users tend to be marijuana users, the different coding systems should not prove problematic. For abbreviation purposes, therefore, we use the term "marijuana" in further discussion of this drug type.

Figure 2.1: Past Month-Past Year Marijuana Use



During 1987-89, the arrestee marijuana urinalysis procedure showed rates of use similar to past-year high school senior rates. However, the yearly high school senior rates were higher than the yearly household rates throughout the entire period of study.

- The marijuana rate for DUF arrestees in 1990 was 19.0 percent.
- The marijuana rate for HSSS seniors in 1990 was 14.0 percent during the past month and 27.0 percent during the past year.
- The marijuana rate for NHSDA households in 1990 was 5.1 percent during the past month and 10.2 percent during the past year.

All three groups are comparable in demonstrating a strong downward trend in marijuana use over time, despite their different populations.[4]

- Between 1979 and 1990, the NHSDA yearly rate declined by 42.7 percent; the monthly rate declined by 59.8 percent. Between 1979 and 1990, the HSSS yearly use declined by 46.9 percent; the monthly use declined by 61.6 percent. During 1987-90, DUF marijuana use declined by 47.5 percent.

The Utility of Geographic and Demographic Comparisons

Since overall drug use rates do not demonstrate geographic variations and demographic subgroup differences, we investigate that issue here. This type of information is particularly important not only for understanding drug use patterns and trends among various segments of the population but also for assessing the geographic areas most in need of targeted intervention strategies.

Geographic Comparisons

The DUF data in table 2.2 show that there are 9 sites in which the marijuana use rate exceeded 40 percent in one or more study years 1987-90. In each of these sites, the use rate declined in 1990 from 1987-88 levels, but 2 sites still show 1990 marijuana rates to be at least 30 percent. An additional 10 of the 24 sites indicate 1990 rates to be at least 20 percent. Comparing DUF data across sites, however, is difficult since the study used different inclusion and exclusion criteria (see chapter 3).

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[4] In the case of DUF, the direction and degree of change may, in part, be a function of differential site participation rates during the study period (see table 2.2). To assess this situation, we compared marijuana drug use rates between two groups: the 10 sites participating in 1987 and the additional 12 sites entering the study in 1988-89. There was only a small difference (2.3 percent) between the groups on the total 1989 marijuana drug use rate (25.7 percent versus 23.4 percent).

Table 2.2: Rate of Marijuana Use Across DUF Sites 1987-90 (Males and Females Combined)

Site	1987	1988	1989	1990
Atlanta	[a]	[a]	[a]	2.9%
Birmingham	[a]	33.3%	20.6%	11.7
Chicago	39.4%	48.3	30.3	26.9
Cleveland	[a]	26.0	19.5	12.9
Dallas	[a]	32.4	23.5	19.7
Denver	[a]	[a]	[a]	23.5
Detroit	28.9	31.7	21.1	13.4
Fort Lauderdale	26.5	42.2	22.4	20.2
Houston	40.8	42.3	21.4	17.8
Indianapolis	[a]	40.9	35.0	27.7
Kansas City, Mo.	[a]	18.3	23.6	15.2
Los Angeles	19.6	28.8	18.2	16.4
Manhattan, N.Y.	29.8	26.9	17.1	17.0
Miami	[a]	32.0	29.0	[a]
New Orleans	46.3	41.7	25.2	16.0
Omaha	[a]	43.5	[a]	20.1
Philadelphia	[a]	29.9	23.0	16.2
Phoenix	42.1	39.7	31.5	24.5
Portland, Ore.	45.1	46.5	31.2	37.9
St. Louis	[a]	16.4	25.5	13.9
San Antonio	[a]	34.3	24.3	20.9
San Diego	42.1	43.8	38.5	30.3
San Jose	[a]	[a]	21.6	20.3
Washington, D.C.	[a]	[a]	11.4	6.7

[a] Site did not participate in the study.

The NHSDA and HSSS designs permit analyses by Bureau of the Census regions—that is, Northeast, North Central, South, and West—rather than by city and county.

For HSSS, the Northeast shows the highest yearly rates of marijuana use throughout the entire study period 1975-90 (with the exception of 1989).[5] The South displays the lowest rates of use during the 16-year period. Each of the four regions experienced a substantial decline between 1979 (the height of marijuana use) and 1990: the Northeast declined from 60.6 percent to 32.2 percent, the North Central region declined from 52.2

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[5] None of the DUF sites demonstrating marijuana use rates in excess of 40 percent was located in the Northeast.

percent to 28.7 percent, the West declined from 51.9 percent to 28.3 percent, and the South declined from 41.2 percent to 21.4 percent. Rates of marijuana use in 1990, however, still ranged between 21.4 percent and 32.2 percent across the regions.

NHSDA shows similar substantial declines across all regions between 1979 and 1990. Among 18-25-year-olds (the subgroup with the highest past-year use), the marijuana rate in the Northeast declined from 52.0 percent to 23.0 percent, in the North Central region from 50.0 percent to 24.8 percent, in the West from 47.0 percent to 31.4 percent, and in the South from 41.0 percent to 21.2 percent.[6]

Age Comparisons

DUF divides arrestees into persons age 15-20, 21-25, 26-30, 31-35, and 36 or older. NHSDA has most recently used age group distinctions 12-17, 18-25, 26-34, and 35 or older (in previous years, the last two categories were merged). For assessment purposes, we requested NIJ to recode the DUF data to make them congruent with the NHSDA data. HSSS is composed of only high school seniors.

Resulting age data from the NHSDA, HSSS, and DUF studies demonstrate a similar recent downward trend among groups in marijuana use. For both households and arrestees, 18-25-year-olds demonstrated the highest rates, the oldest groups (26 and older) the lowest rates.

Race and Ethnicity Comparisons

DUF has shown sharp racial and ethnic declines in booked arrestee marijuana use since 1988. Between 1988 and 1990, use by whites declined from 40.1 percent to 25.0 percent, use by blacks declined from 35.0 percent to 15.7 percent, and use by Hispanics declined from 34 percent to 20.8 percent.

For NHSDA, Hispanic subgroup data were not available before 1985. Since then, marijuana past-year use rates among Hispanics have remained basically stable, going from 11.5 percent in 1985 to 10.9 percent in 1990. Between 1985 and 1990, past-year use among whites decreased from 15.4 percent to 10.1 percent, and among blacks it decreased from 17.9 percent to 11.2 percent.

Yearly and monthly racial and ethnic data have not been published for high school seniors in HSSS, owing to their lack of statistical precision.

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[6] Early data from NHSDA were distinguished by age group; NHSDA totals across age groups were not available for geographic data.

Cocaine

Overall Rates

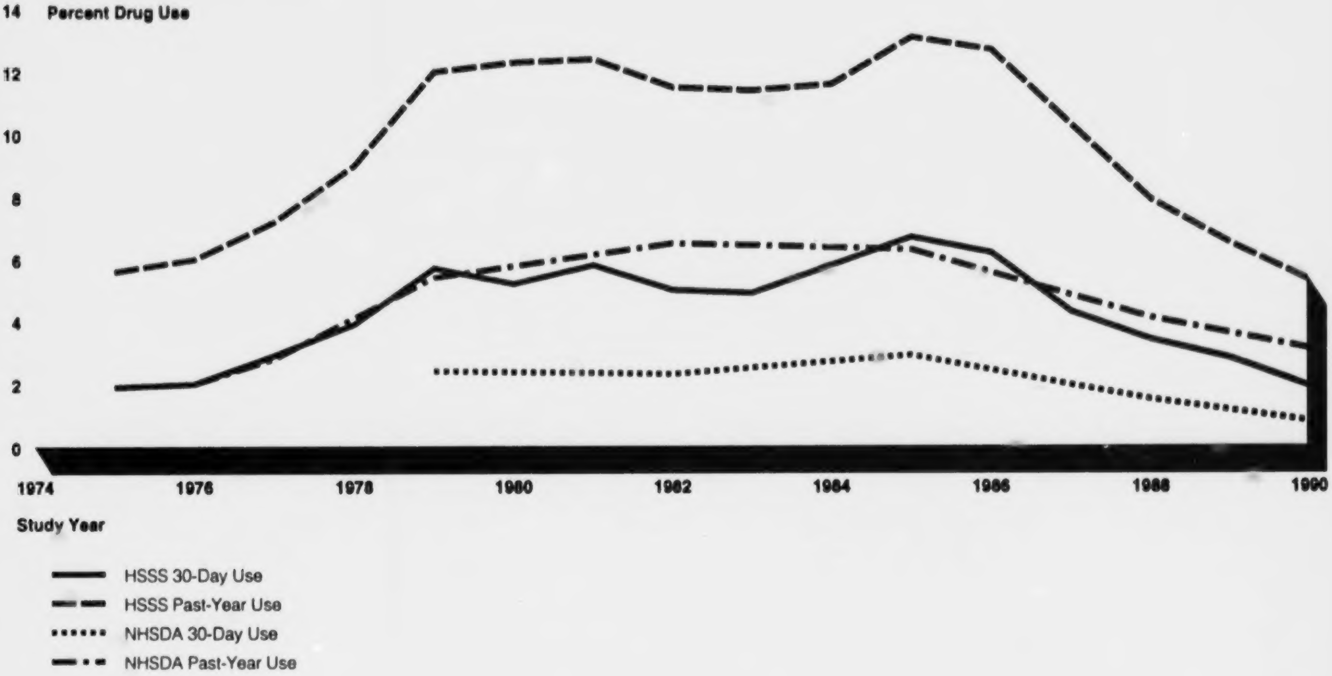
Table 2.3 gives the overall cocaine use rates for NHSDA, HSSS, and DUF for 1987-90. Figure 2.2 provides the past-month and past-year drug use patterns for general households and high school seniors for NHSDA and HSSS from 1975 to 1990. Once more, NHSDA and HSSS findings are based entirely on self-reported drug use data. Presented DUF findings are based on urinalysis results, with a limited window of detection—approximately 12 to 72 hours for cocaine.

Table 2.3: Overall Cocaine Use Rates

	NHSDA		HSSS		
Year	Past month	Past year	Past month	Past year	DUF
1987	[a]	[a]	4.3%	10.3%	46.2%
1988	1.5%	4.1%	3.4	7.9	50.7
1989	[a]	[a]	2.8	6.5	50.1
1990	0.8	3.1	1.9	5.3	42.5

[a] Survey not conducted.

Figure 2.2: Past Month-Past Year Cocaine Use



DUF arrestee data demonstrated substantially higher overall cocaine rates than the NHSDA and HSSS subject groups throughout 1987-90. HSSS data, in turn, were only slightly higher than those in NHSDA.

- Urinalysis showed a use rate for arrestees in 1990 of 42.5 percent.
- The self-report use rate for high school seniors in 1990 was 1.9 percent during the past month, 5.3 percent during the past year.
- The self-report use rate for general households in 1990 was 0.8 percent during the past month, 3.1 percent during the past year.

While each group showed sizable trend decreases in marijuana use, the result is mixed for cocaine.[7]

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[7] As in the case of marijuana, we explored the possibility that the direction and degree of DUF change might be influenced by differential site participation rates. There was only a 3.1-percent difference in the total cocaine rate between sites entering the study in 1987 compared with those entering in 1988-89.

- Since 1985, both households and high school seniors have demonstrated continuous declines in the rate of cocaine use. But for arrestees, the overall rate has been relatively stable, the 1990 rate (42.5 percent) being only 3.7 percentage points lower than that of 1987 (46.2 percent).

Geographic Comparisons

Table 2.4 shows that for arrestees, the cocaine use rate was at least 50 percent at 14 sites during any one of the 4 study years (Manhattan and Philadelphia exceeded 70 percent; Los Angeles, Miami, and Washington, D.C., exceeded 60 percent). As of 1990, cocaine use rates still exceeded 50 percent in 7 sites.

Table 2.4: Rate of Use of Cocaine Across DUF Sites 1987-90 (Males and Females Combined)

Site	1987	1988	1989	1990
Atlanta	[a]	[a]	[a]	62.0%
Birmingham	[a]	49.4%	50.2%	47.6
Chicago	49.6%	59.2	59.3	54.0
Cleveland	[a]	52.9	56.2	49.0
Dallas	[a]	49.0	46.2	43.6
Denver	[a]	[a]	[a]	28.2
Detroit	52.8	53.9	49.8	45.9
Fort Lauderdale	45.5	42.7	51.1	48.6
Houston	40.3	48.3	51.4	52.0
Indianapolis	[a]	15.3	25.5	16.2
Kansas City, Mo.	[a]	47.6	50.1	36.5
Los Angeles	54.8	60.2	57.0	48.6
Manhattan, N.Y.	71.1	74.8	70.6	64.8
Miami	[a]	64.6	64.7	[a]
New Orleans	39.2	47.9	57.8	50.7
Omaha	[a]	20.7	[a]	10.2
Philadelphia	[a]	70.8	72.7	64.7
Phoenix	22.7	32.0	39.0	30.5
Portland, Ore.	30.6	43.8	40.8	24.8
St. Louis	[a]	36.1	48.8	42.1
San Antonio	[a]	25.9	26.6	25.0
San Diego	38.4	44.1	40.6	42.5
San Jose	[a]	[a]	30.3	26.6
Washington, D.C.	[a]	[a]	63.1	53.4

[a] Site did not participate in the study.

Between 1987 and 1990, 6 sites experienced an increase in the cocaine use rate: Chicago, Fort Lauderdale, Houston, New Orleans, Phoenix, and San Diego. Only in Houston and New Orleans did this increase exceed 10 percentage points.

As with marijuana, one must be careful in interpreting these DUF results for cocaine. Some of these data are countywide, others citywide, while others cover only a subsection of the land area specified in the site name. For example, the 70-percent rate for Manhattan does not, in fact, cover the entire borough of Manhattan but is instead for a single central booking facility in lower Manhattan.

For HSSS high school seniors, minimal differences existed across the four Bureau of the Census regions in 1975 (range of 5.1 to 7.8 percent). By 1980, cocaine use in the West had risen to almost triple that of the South (20.6 percent versus 7.8 percent) while the rate in the Northeast was double that of the South (14.2 percent versus 7.8 percent). During 1985-90, drug use rate declines were apparent, such that by 1990 regional differences were again minimal (range 4.1 to 6.6 percent). This self-reported decrease in use could be a function of both lower drug use rates and greater underreporting because of social disapproval of cocaine. Given the available data, it is not possible to determine how much of the decrease can be attributed to either factor.

Drug use trends for 18-25-year-olds (the most prominent users of cocaine) in NHSDA were similar to those for high school seniors in HSSS. In 1982, cocaine use in the West and Northeast was more than twice that of the South (30 and 25 percent, respectively, versus 12 percent). By 1990, all regions were within 7 points of each other (range 5.7 to 11.8 percent).

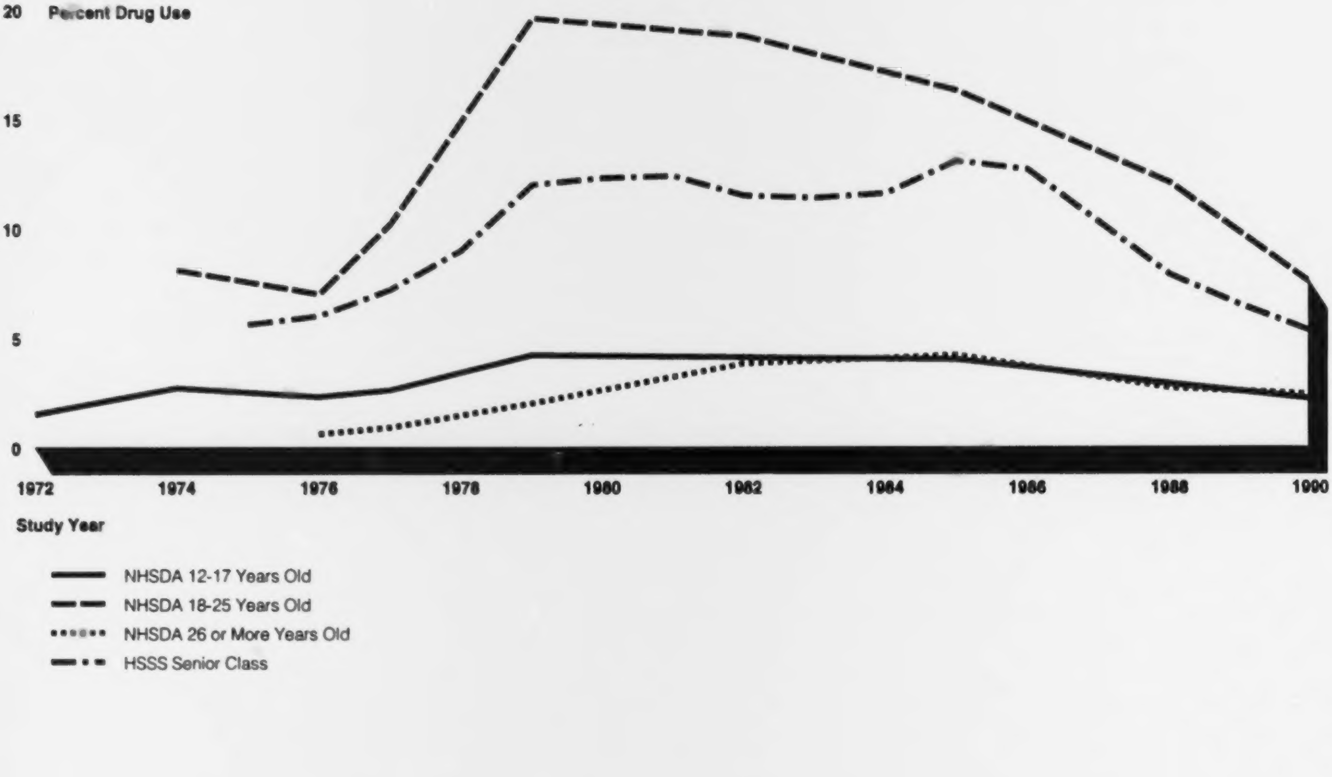
For arrestees, the DUF data show that in many areas throughout the country, cocaine use continues to be a major problem in the 1990's. The NHSDA and HSSS groups show much lower rates of use and declining trends in recent years. Regional factors in NHSDA and HSSS seem to be important during times of extensive cocaine use but diminish as cocaine use subsides. More specifically, the data indicate that certain areas of the country manifested higher rates of cocaine use while the drug was in vogue (that is, the West and Northeast) while other areas (the South) consistently manifested lower rates of use during the entire 16-year period 1975-90.

Age Comparisons

For 1987, DUF arrestees demonstrated cocaine use rates in excess of 30 percent across all age groups. For the 4-year period 1987-90, cocaine use in the 12-17-year-old age group declined from 42.3 percent to 17.5 percent; in the 18-25-year-old age group, it declined from 45.3 percent to 35.7 percent. Use in the two older groups remained stable, the change in the 26-34-year-old group going from 50.0 percent to 51.2 percent and use in the 35 and over group going from 41.9 percent to 42.6 percent. Thus, cocaine use among booked arrestees did not universally decline across all age groups from 1987 to 1990.

Among high school seniors, annual cocaine use increased from 5.6 percent in 1975 to a high of 13.1 percent in 1985. After that, it declined to 5.3 percent among the 1990 senior class. (See figure 2.3.)

Figure 2.3: Past-Year Cocaine Use by Age



Among general households, annual cocaine use among 18-25-year-olds increased from 7.0 percent in 1976 to 19.6 percent in 1979. By 1990, the rate had declined to 7.5 percent. Other age subgroups within NHSDA also demonstrated declines, although their total rate did not exceed 5 percent throughout the entire period of study 1972-90.

Race and Ethnicity Comparisons

DUF data show that blacks exhibited the highest rates of cocaine use throughout the 4 years of data collection, Hispanics rank second, and whites third. This is the reverse of what the data show for marijuana in 1989-90, when whites demonstrated the greatest use, blacks the least.

For cocaine, rates of use by blacks remained steady, ranging from 57.3 percent in 1987 to 53.3 percent in 1990. Use by Hispanics declined from 47.2 percent in 1987 to 36.3 percent in 1990. Use by whites also remained steady: 27.0 percent in 1987, 25.6 percent in 1990.

For NHSDA, data for whites, blacks, and Hispanics could not be differentiated before 1985. During 1985-90, no sharp racial-ethnic past-year cocaine use distinctions prevailed between these groups (that is, for each study year, group differences were less than 3 percentage points). Blacks and whites showed some decreases over their already low rates (6.2 to 4.0 percent and 6.4 to 2.8 percent, respectively); use by Hispanics remained basically stable (5.1 to 5.2 percent). HSSS does not currently track yearly racial and ethnic data.

Heroin and Other Opiates

Overall Rates

NHSDA has not been a useful tool for tracking heroin use, nor was it expected to be, given that heroin users frequently do not live in typical household settings. Through 1990, NIDA judged both the past-month and past-year use estimates to be low in precision and, therefore, did not publish these results. It is principally for this reason that household use rates for heroin and other opiates are not considered in this section.

Table 2.5 gives the overall heroin and other opiate use rates for 1987-90 for the remaining two study groups.[8] Not surprisingly, arrestees demonstrated higher heroin and other opiate use rates than high school seniors during the entire period. The 1990 urinalysis scores (based on only a 2-to-4-day detection period) among arrestees showed a 9.6-percent use rate, a figure that was more than five times higher than the past-month heroin and other opiate use reported by high school seniors and approximately twice the past-year use rate.

- The rate for heroin use among HSSS respondents in 1990 was 0.2 percent during the past month, 0.5 percent during the past year. For other opiates, the rate was 1.5 percent for the past month, 4.5 percent for the past year.
- During 1987-90, the DUF heroin and other opiate use rate dropped from 13.9 percent to 9.6 percent. For 1979-90, the HSSS rate of past-year heroin use remained stable at less than 1 percent; the rate for other opiate use declined from 6.2 percent to 4.5 percent.

Table 2.5: Overall Heroin and Other Opiate Use Rates

	HSSS[a]		
Year	Past month	Past year	DUF[b]
1987	0.2%/1.8%	0.5%/5.3%	13.9%
1988	0.2/1.6	0.5/4.6	12.9
1989	0.3/1.6	0.6/4.4	10.5
1990	0.2/1.5	0.5/4.5	9.6

[a] HSSS provides separate scores for heroin and other opiate use (percent heroin use/percent other opiate use).

[b] DUF provides a combined heroin and other opiate drug use score.

Less than 1 out of 100 high school seniors overall are reporting heroin use in the past year. This may be somewhat of an underestimate. The NIDA grantee has indicated that there are strong student sanctions against the use of heroin, which may be precipitating socially desirable response patterns; data users are urged that "absolute prevalence figures . . . be interpreted with a high degree of caution." If underreporting is constant throughout the period of study, then "trends may be estimated more reliably than absolute prevalence levels."[9] The same would hold true for both marijuana and cocaine.

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[8] There are differences, however, between DUF and HSSS in drug data coding and presentation. DUF publications report a combined heroin and other opiate urinalysis score. HSSS publications provide separate self-reported data for both heroin and the other opiates.

Geographic Comparisons

Because the 1990 HSSS heroin use rate was extremely low (0.5 percent) and did not vary by more than 0.5 percent during 1975-90, we present no further study of HSSS geographic and demographic patterns. They would not prove meaningful, given the minimal variance or opportunity for differentiation among subgroups.

In chapter 3, we raise the limitations of NHSDA and HSSS to deal with the heroin issue, and in chapter 4 we propose recommendations for obtaining more accurate heroin use rates. In this section, then, we focus only on geographic differences evident in the DUF data.

Table 2.6 demonstrates that in 7 of the 24 sites, the heroin and other opiate use rate exceeded 15 percent during at least one study year between 1987 and 1990. Three areas exceeded 20 percent (Chicago, Manhattan, and San Diego). Chicago is the one site that has had a sizable increase since 1987, almost doubling that year's total in 1990 (13.6 percent to 26.9 percent). Manhattan is the only site demonstrating a greater than 25-percent decrease between 1987 and 1990 (amounting to an absolute difference of 6.9 percent).

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[9] Lloyd Johnston, Patrick O'Malley, and Jerald Bachman, Drugs and American High School Students: 1975-1983 (Rockville: National Institute on Drug Abuse, 1984), p. 197.

Table 2.6: Rate of Use of Heroin and Other Opiates Across DUF Sites 1987-90 (Males and Females Combined)

Site	1987	1988	1989	1990
Atlanta	[a]	[a]	[a]	5.1%
Birmingham	[a]	6.9%	4.6%	6.5
Chicago	13.6%	18.0	27.5	26.9
Cleveland	[a]	4.3	2.6	3.1
Dallas	[a]	6.9	7.0	6.6
Denver	[a]	[a]	[a]	3.5
Detroit	11.7	12.9	8.2	10.7
Fort Lauderdale	1.5	4.7	2.6	1.6
Houston	7.8	3.6	5.1	6.4
Indianapolis	[a]	4.5	3.6	4.7
Kansas City, Mo.	[a]	3.7	3.2	2.2
Los Angeles	16.4	16.3	15.0	13.7
Manhattan, N.Y.	25.6	24.8	18.3	18.7
Miami	[a]	1.1	1.9	[a]
New Orleans	5.2	6.2	6.0	6.4
Omaha	[a]	1.1	[a]	1.7
Philadelphia	[a]	12.6	10.8	9.3
Phoenix	7.2	8.4	10.3	8.6
Portland, Ore.	13.5	16.1	18.0	13.7
St. Louis	[a]	6.2	7.0	6.3
San Antonio	[a]	18.4	16.6	18.0
San Diego	22.1	21.0	21.5	19.9
San Jose	[a]	[a]	7.6	8.9
Washington, D.C.	[a]	[a]	15.4	14.9

[a] Site did not participate in the study.

Age Comparisons

For the 12-17-year-olds, there was a drop from 9.0 percent in 1987 to 2.2 percent in 1990; for the 18-25-year-olds, a smaller decline from 9.6 percent to 5.1 percent; for the 26-34-year-olds, a drop from 16.4 percent to 10.7 percent; and for those 35 and older, less than a 3-percent change (19.4 percent to 16.6 percent).

Race-and-Ethnicity Comparisons

During the 4-year period, Hispanics demonstrated the greatest decline in use, from 22.7 percent in 1987 to 15.2 percent in 1990. Use by whites declined 3.7 points, from 13.9 percent to 10.2 percent; and use by blacks declined 2.8 points, from 10.8 percent to 8.0 percent.

Summary and Conclusions

In this chapter, we reported current and changing drug use rates among general households, high school seniors, and booked arrestees from the NHSDA, HSSS, and DUF studies. Table 2.7 summarizes the changes taking place in each data set.

Table 2.7: Changes in Drug Use Rates

				Demographic subgroups								
	Overall			Geographic			Age			Race-ethnicity		
	MJ	C	H/O	MJ	C	H/O	MJ	C	H/O	MJ	C	H/O
NHSDA	↓	↓	NA	↓	↓	NA	↓	↓	NA	M	M	NA
HSS	↓	↓	M	↓	↓	NI	↓	↓	NI	NA	NA	NA
DUF	↓	S	↓	↓	M	M	↓	M	↓	↓	M	↓

Legend:

MJ = Marijuana.
C = Cocaine.
H/O = Heroin and other opiates.
NA = No precise data published for yearly and monthly rates.
↑ = If rate of change increased by greater than 10 percent.
↓ = If rate of change decreased by greater than 10 percent.
S (stable) = If either increase or decrease is less than 10 percent.
M (mixed) = Combination of ↑, ↓, S findings.
NI = Analysis not included: heroin rates very low, absolute values in question.

With regard to marijuana, there is a similar pattern across groups. That is, each shows declines when overall prevalence, geographic, and age variables are examined. NHSDA does, however, demonstrate some mixed results for marijuana when the race-and-ethnicity variable is considered.[10]

For cocaine, there is somewhat less similarity across groups. The NHSDA and HSSS groups show recent declines on the overall prevalence, geographic, and age variables, but DUF results indicate overall stability of rates of use among arrestees (at high levels—approximately 40 percent) and mixed, or contradictory, patterns in the geographic, age, and race-and-ethnicity analyses. NHSDA also exhibits mixed results on the race-and-ethnicity variable.

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[10] "Mixed" results is defined here as a combination of two or more of the following findings among various subgroups of the target population: variable rates of change increasing over time by more than 10 percent, variable rates of change decreasing over time by more than 10 percent, or variable rates of change increasing or decreasing over time by less than 10 percent (in which case the rate of change over time is said to be basically "stable"). To illustrate, in the case of NHSDA, marijuana drug use patterns among Hispanics were basically "stable" 1985-90, going from 11.5 to 10.9 percent, a decrease of less than 10 percent. Blacks declined from 17.9 to 11.2 percent, a decrease of 37.4 percent.

For heroin and other opiates, the picture is more complicated. Through 1990, the NHSDA past-month and past-year use rates were statistically imprecise and not published; the HSSS heroin rates were tenuous. DUF demonstrated declines on the overall, age, and race-and-ethnicity variables and mixed results in terms of geography. But there was also a relatively sizable DUF heroin use variation between sites participating in 1987 and the additional sites entering in 1988-89. Much additional research is necessary if we are to gain a comprehensive understanding of the heroin prevalence rate.

Chapter 3

Strengths and Limitations of the Three Studies

The purpose of this chapter is to clarify the strengths and limitations of the NHSDA, HSSS, and DUF studies. These will be examined from the perspective of whether the study research operations satisfy research protocol standards. To do this, we evaluated the studies based on indicators derived from the 24 dimensions cited in table 1.2. The important strengths and limitations are indicated below.

National Household Survey on Drug Abuse

Strengths

Project Management

NHSDA is managed by highly qualified individuals who have demonstrated a successful track record in drug abuse research. The latest contract organization, the Research Triangle Institute, constitutes one of the most distinguished drug research institutes in the United States.

Sampling Strategy

NHSDA is the only national drug use survey of American households. It employs a multistage probability sampling procedure that has taken into consideration the 48 coterminous states between 1972 and 1990 and all 50 states as of 1991.

The sample design ensures the appropriate inclusion of persons at various ages (12-17, 18-25, 26-34, and 35 and older) as well as those of diverse ethnic and racial background (that is, Hispanic, black non-Hispanic, and white non-Hispanic). An oversampling procedure obtains cost-effective minority and age representation, with weights applied for nonrespondents.

A random sampling procedure is used to select specific persons in the household for interview rather than relying upon a "convenience sampling" of available residents or a "quota sampling" that is left to the interviewer's discretion. Return visits are made if the selected person is not at home or is otherwise unavailable.

Screening and Interview Completion Rates

Screening rates (for selecting appropriate household respondents) over the past three survey administrations (1988, 1990, and 1991) were 93.3 percent, 96.4 percent, and 96.5 percent, respectively. Corresponding interview rates of such respondents were 74.3 percent in 1988 (under conditions of a late contract), 82.0 percent in 1990, and 84.2 percent in 1991.

Statistical Procedures

Statistical tests (that is, z-tests) have been employed since the 1970's to determine whether there are significant differences between drug prevalence rates on consecutive survey administrations. Observation of a series of significant results over time in the same direction provides evidence for either an upward or downward trend in the data. (Not all specific study years, however, need demonstrate significant results.)

Cognitive Laboratory Studies

The Research Triangle Institute has been conducting cognitive laboratory studies to determine whether there are more effective, user-friendly, ways to access requisite drug use information. It has explored important issues related to data point anchoring, drug product description, pillcard presentation, and recall strategies. A split-half questionnaire will be administered in 1994 to assess survey differences.

Drug Types Considered

NHSDA considers the use of the major illicit drugs (marijuana and hashish, cocaine, heroin and other opiates, hallucinogens, inhalants), the nonmedical use of psychotherapeutics (stimulants, sedatives, tranquilizers, and analgesics), alcohol, cigarettes, and, as of 1991, anabolic steroids. Where the data are statistically precise, NHSDA computes monthly, yearly, and lifetime estimates.

Limitations

Self-Report

Our review of the literature prior to 1985 has shown drug use self-reports to be generally valid across multiple studies, when compared against urinalysis, polygraph, and agency records. These conclusions must now be reconsidered in light of further developments:

- Many of the often-cited studies were conducted between 1965 and 1980, when societal reaction toward drug use was not as strong as it is today. Self-reports may thus have been more honest.
- There are now more sensitive urinalysis methods than those adopted in the earlier literature to check self-reports. The currently used EMIT urinalysis screen has proven to be more sensitive than the previous thin layer chromatography (TLC) for detecting positive results.
- Multiple early self-report studies used samples of drug patients. There may have been less reason to underreport their drug use patterns as their behavior was already known to treatment center personnel.

More recent studies (1985-91) provide mixed evidence. Some have confirmed the validity of the self-report method. Others found particular groups giving notably inaccurate self-reports (for example, arrestees, pregnant females, and discharged clients). Underreporting of the more socially disapproved drugs has also been noted. Validity studies of self-report in the general household population need to be conducted. We have yet to determine the accuracy of the self-report across different drug types for varying household subpopulation groups.

Two particular self-report concerns focusing directly on NHSDA relate to issues of privacy and survey completion difficulty.

Privacy Issues. Although intended to be done in privacy, NHSDA interviews often are not—with obvious potential effects on truthfulness. Among subjects age 12-17 at the time of survey administration, 1988 data show that about one third (30.1 percent) of the Hispanic subjects and about one fourth (23.7 percent) of the non-Hispanic black subjects had someone else in the interview room at least one third of the time.

Comparable findings were demonstrated in 1990: 30.9 percent of the Hispanics age 12-17 and 26.4 percent of the non-Hispanic blacks had someone else in the room at least one third of the time.

Empirical studies have been few and conflicting concerning the relationship between levels of perceived privacy and drug use questionnaire reporting among general household populations.

Survey Difficulty. People can have trouble with surveys like NHSDA for many reasons: poor understanding of the English language, inability to understand drug use jargon, problems completing the survey instrument, confusion in identifying specific drugs, and uncertain memory about dates of use. Each of these difficulties can compromise the validity of drug use responses.

It is, therefore, of concern that NIDA's contractor found that older subjects had difficulty completing the survey instrument in 1988. Approximately one in five Hispanics (20.4 percent) 35 and older had either "a fair amount of difficulty" or "a lot of difficulty." Approximately one in five non-Hispanic blacks (22.0 percent) gave the same reply.

Exclusion Criteria

NHSDA was initially designed to determine the rate of drug use within American households. In so doing, the survey has traditionally excluded subgroups at particularly high risk for drug use (prisoners, treatment center clients, the homeless, and transients). This, however, was by design, not by fault. Until 1991, NIDA sought to limit the domain of NHSDA to traditional household environments. Other intramural and extramural grants and contracts have been awarded or are being considered to reach other population groups of interest.

The Nonresponse Rate

All drug survey research must deal with hidden populations—those who are not identifiable or accessible—as well as persons who refuse to participate. To deal with the problem of nonresponse, an extensive system of weighting adjustments has been devised, taking into consideration each of the multistage components of the study. The implicit assumption in the NHSDA weighting system is that nonresponse patterns will be comparable, or at least similar, to those of subject participants. But as indicated by the contractor, "To the extent that nonrespondents differ from respondents in their drug use, survey estimates from the NHSDA study are inaccurate. The issue of nonresponse is not a trivial one for the NHSDA study."[1]

This issue is of particular importance given that several groups have nonresponse rates in excess of 20 percent. For example, in the 1988 national survey,

- Subjects 18-25 had a 24.3-percent nonresponse rate; those 26-34 had a 26.7-percent rate, and those 35 and older had a 27.9-percent rate.
- Males had a 25.9-percent nonresponse rate; females had a 21.3-percent rate.
- Whites had a 22.4-percent nonresponse rate; blacks had a 24.6-percent rate; those categorized as "other" had a 30.0-percent rate.

It should be recognized, however, that 1988 was an atypical year. The overall interview response rate during that year was approximately 8 percent lower than in 1990 and 10 percent lower than in 1991.

NIDA has been sponsoring work in this area. The contractor assessed the 1988 NHSDA nonresponse patterns and found that 1,365 of the 3,046 interviews were not completed (44.8 percent) because of subject refusal, 52 (1.7 percent) because of a "breakoff" or partial interview. This means that approximately half the nonresponses stemmed from subjects unwilling to participate. Another 31.3 percent were caused by respondents not at home.

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[1] Research Triangle Institute, Results From the Nonrespondent Followup Study to the Washington, D.C. Portion of the 1990 National Household Survey on Drug Abuse (Research Triangle Park, N.C.: August 1991), p. 1.

In the Washington, D.C., 1990 Nonrespondent Followup Study to the NHSDA, interviewers were asked to indicate the nonrespondents' reasons for not participating in the Followup Study. In no instance was drug use directly indicated. This is not altogether surprising, given a social climate in which drug use is disapproved. The veracity of this finding, however, is suspect, given that in 32.5 percent of the cases the reasons for refusal were related to not "wanting to answer that kind of question," considering the survey as an "invasion of the person's privacy," and efforts of a second person to not "allow" the subject to engage in the study. (In another 42.7 percent of the cases, refusers were cited as "not interested" in participating.) Further study of the relationship between nonresponse and drug use is therefore warranted.

Problems in Heroin Measurement

Given the increased availability and purity of heroin, at a lower price structure, there is concern about a renewed increase in heroin use. Tracking changes in the heroin prevalence rate has therefore taken on new interest. There are, however, major problems in using NHSDA as a barometer.

Sample Size of Heroin Users. NHSDA has found few subjects who indicated the use of heroin during the past month and during the past year. In part, this reflects the relatively low prevalence rate of heroin use in this country. But it is also a function of the fact that heroin users are frequently not situated in the household environment or are excluded because they are transient.

In 1988, only 35 of 8,814 subjects participating in NHSDA indicated that they had used heroin during the past year. In 1990, there were only 32 of 9,259 subjects, and in 1991, 127 of 32,594. In the entire national survey, only 9 people acknowledged using heroin in the past month in 1988, 6 in 1990, and 33 in 1991.

Subgroup figures were, of course, even smaller: in 1990, for example, only 1 Hispanic male indicated heroin use in the past year, only 7 black males and 13 white males. Similarly, there were only 4 Hispanic females, 3 black females, and 4 white females indicating past-year use of heroin. The generalization of NHSDA results to each subgroup is therefore impossible given these limited numbers. The traditional NHSDA design was principally restricted to American households. Other data collection procedures must be adopted to reach the heroin users.

Imputation Procedures and Associated Population Projections. Recent attempts to include as many cases and variables as possible in the generation of drug use estimates have focused on ways to assign data points to initially missing values and to derive consistent data responses from inconsistent ones. These strategies have come to be known as "imputation" procedures, since researcher-resolved values are attributed or ascribed to the data set.

On the survey form, subjects were asked to state the most recent time when they used heroin. This information was then checked with subsequent questions on the survey form to determine whether any other heroin-related items yielded a conflicting, earlier point of drug use. If so, the "logical imputation" procedure called for modifying the "recency-of-use" variable to reflect this earlier point in time. Survey results were then projected to estimate national heroin use.

A comparison of nonimputed and logically imputed past-year heroin use estimates for 1991 showed that the imputed estimates were considerably higher, a difference of 469,000:

- 1991: 701,000 estimated heroin users imputed
- 1991: 232,000 estimated heroin users nonimputed

In investigating the discrepancy, NIDA discovered that a change in the 1991 survey format led to an additional 53 individuals being inappropriately imputed as past-year heroin users. When the imputations were corrected, and the population projections recalculated, there was a 46-percent drop in the number of estimated heroin users, from 701,000 to 381,000.

NIDA planned to initiate new quality-control procedures to minimize the probability that this imputation problem can recur. According to the project officer, multiple item checks and the effect of significant questionnaire change patterns were to be investigated as standard editing practice. But NHSDA implementation has been shifted to SAMHSA. Computer-assisted personal interviews are being considered as one means of ascertaining inconsistencies at the time of interview, with resolution occurring then rather than relying on imputation procedures.

But there is still the larger question of under what conditions it is appropriate to employ the imputation procedure. While the desire to make use of as much data as possible in generating drug prevalence estimates is understood, there is no inherent empirical or theoretical reason why initial recency-of-use responses should be superseded by a single later question. Understandably, if multiple similar responses countered the initial reply, then there would be a preponderance of evidence in favor of change. But a single opposing response leaves doubt as to which is the more appropriate and accurate reply.

This imputation issue has bearing not just upon heroin but across the entire NHSDA. In a Research Triangle Institute report on faulty data prepared for NIDA, it is mentioned that of 5,846 respondents who indicated use of a drug in the previous 12 months during study year 1988, 1,805 (or 30.88 percent) demonstrated contradictory responses. (This finding also raises further concerns about the credibility of self-report responses.)

While NIDA officials have understood the nature of our concerns, they point out that changing the imputation procedures in midstream can also influence estimated survey results and trends. To date, the agency has maintained standardization rather than adopting a more conservative imputation procedure.

Similarly, national drug use population projections can be misleading when based on a very small number of user cases. Sampling and nonsampling errors can be magnified considerably. Therefore, we advocate caution in the interpretation of any nationally projected absolute numbers of drug users when the data base does not adequately cover the target population and the sample user proportion is small. We believe it would be useful to adopt more stringent standards regarding statistical projections before heroin (and other rare drug use) survey data are projected as national estimates. Indeed, instead of attempting to determine specific absolute rates, it might be more worthwhile to develop estimated ranges of drug use.

Weighting Procedures and Population Projections. In addition to the imputation issue, there are also concerns regarding the weighting procedures implemented. One study conducted for the Office of National Drug Control Policy (ONDCP) revealed two peculiar findings when the 1991 NHSDA age variable was weighted (to account for subject sampling probabilities and nonresponse rates):

- 148,000 of the total 701,000 annual heroin users were age 79, and
- 32 percent of the users were older than 60.

Further detailed study showed that the 148,000 population projection figure was generated from only 2 heroin-using subjects. One 79-year-old woman, when projected to the national level, accounted for an estimated 142,000 heroin users, or about 20 percent of all 1991 past-year heroin users. In similar fashion, 32 percent of the annual heroin user distribution was older than 60; this was based on population projections from only 7 heroin-using subjects.

Estimation problems were also uncovered within the 1988 NHSDA annual heroin data. One weighted individual, age 64, accounted for 112,000 heroin cases when projected as a national estimate, or 21 percent of the total number of estimated past-year users.

Weighting is of particular concern when estimating the prevalence of rare behaviors like heroin use. Given the comparatively small number of individuals using heroin in the entire household population, the expectation is that few using subjects will appear in any probability sampling procedure. As shown above in relation to age, this raises the possibility of obtaining inflated drug use figures based on only a limited number of cases. As indicated with regard to imputation, we believe it may be more worthwhile to develop ranges of drug use (when weighting is problematic) than to rely on the accuracy of any point prevalence estimate.

Problems in Cocaine Measurement

Prevalence of Weekly Cocaine Use. In the 1990 NHSDA, the number of individuals said to be using cocaine "once a week or more" was estimated at 662,000. In 1991, this estimate increased to 855,000, indicating a jump of almost 200,000 weekly cocaine users within a single year. This sharp increase has been taken as one indicator of the need to fight a "two-front drug war": one with casual, recreational users, the other with the more hard-core, frequent users.

In 1992, NIDA revised the 1991 population estimate, first from 855,000 down to 654,000 and then to 625,000, implying that the frequency of weekly cocaine users in NHSDA had not been rising between 1990 and 1991. Problems with statistical imputation precipitated these revisions.

Closer scrutiny should have been given to the weekly cocaine data prior to publication in the Population Estimates, given their importance in the development of national drug control policy. While it is realized that NIDA and its contractor may not always be able to effectively edit all NHSDA data within a mandated period, we certainly think that more adequate quality control procedures could have caught findings of such significant policy relevance.

Prevalence of Monthly Cocaine Use. Given earlier concerns expressed about the heroin imputation procedure, we reviewed the cocaine data editing procedures as well. Results indicated that for 1990, 53 of 131 past-month cocaine users were imputed, a total of 40.5 percent of the entire past-month sample of users. All 53 imputed cases did not initially indicate use of cocaine during the past month.

Cocaine Nonresponse Rates. In the primary sampling units where drug use was relatively high (between 20 and 30 percent), 40.0 percent of the subjects in the area did not respond in 1988 to the question about past-year cocaine use. In primary sampling units where drug use was only 10 to 20 percent, high rates of nonresponse were also found: 33.3 percent of the subjects residing in these areas did not reply to the question about past-month cocaine use, and 30.3 percent did not reply to the question about past-year cocaine use.

If nonresponders have a higher rate of cocaine use than responders, and some subset of these individuals is not effectively accounted for by other demographic weights, then the 4.1-percent prevalence rate for past-year use of cocaine and the 1.5-percent rate for past-month use of cocaine may be underestimated.

Frequency of Survey Administration

The Anti-Drug Abuse Act of 1988 requires that the extent of alcohol and drug abuse among the general population (as well as among high school students) be assessed annually. NIDA responded by increasing the NHSDA administration frequency from every 2 to 3 years to annually as of 1990. HSSS was already being administered annually.

A yearly data collection strategy is, however, questionable for several reasons: (1) the 1991 total cost allocation was sizable, at $11.5 million, and the projected 1993 cost is $12.6 million; (2) between previous survey administrations, age subgroup prevalence changes for any drug category have typically been minimal; and (3) hard-core, frequent drug users (such as addicted heroin users) are often not found in households. To the degree that the Congress and administration are interested in learning more about cocaine and heroin addicts, other measurement options would be more desirable than conducting NHSDA every year. A biennial NHSDA would also permit more time for cognitive laboratory studies (to investigate questionnaire wording, format, and drug use recall potential), survey field testing, and more in-depth analysis of already collected data.

Geographic Coverage

We have indicated in the section on strengths that NHSDA uses a national multistage probability sample of American households. Geographic data, however, are reported in the yearly Main Findings only by region and population density. This may be considered a limitation to the extent that certain agencies believe that NHSDA should be covering and reporting a wider expanse. ONDCP has been particularly interested in seeing the NHSDA survey data collection frame extended to the state level as well as selected urban areas.

Survey Research Experience and Potential Biases in Data Collection

In 1991, the NHSDA sample size increased more than threefold from 1990 levels (9,259 versus 32,594), owing to the study's inclusion of six metropolitan areas in addition to the regularly scheduled national probability sampling frame.

This necessitated the contractor's engagement of 644 field interviewers in the 1991 administration. When the interviewers were first hired in the firm, 35.1 percent had 1 year or less experience and 45.2 percent (almost half the interview staff) had 2 years or less.

Given the need for such a large number of interviewers, in so short a period of time, it is plausible to consider that many of these individuals may not have had much additional survey experience beyond that initially stated. Using less-experienced interviewers (as well as the potential biasing contributions of the interviewers' demographic backgrounds, knowledge, thoughts, and beliefs about drug use) can pose serious validity threats in a very sophisticated study of an extremely sensitive nature.

In-depth follow-up studies have not been conducted of interviewer-interviewee bias. However, efforts are being made to deal with this issue. Following the transition from NIDA, SAMHSA has been considering the collection of NHSDA data throughout the year rather than at a single point in time. This has two important implications: because of less data collection activity at any one point, fewer interviewers are needed, and if the data collection were undertaken throughout the year, steady work could be offered to the more experienced and able interviewers, thereby reducing the risk of staff turnover.

The High School Senior Survey

Strengths

Project Management

HSSS is being managed by a distinguished group of social scientists at the University of Michigan, with many years of successful experience in the drug abuse field. The same principal investigators have guided the project since its inception in 1975.

Sampling Strategy

HSSS uses a multistage probability design to obtain a nationally representative sample of high school seniors throughout the coterminous United States. The study maps a list of both public and private schools onto their respective PSUs and then selects them randomly with a probability proportionate to enrollment size. As a result, between 120 and 140 public and private schools participate in the study each year. From these schools, 15,000 to 19,000 high school seniors are selected for participation. In concert with school personnel, effort is made to select a representative sample of seniors from each school.

Student Refusal Rate

Among students available for participation in HSSS (that is, excluding absentees, dropouts, and those in the infirmary), the explicit refusal rate has consistently been less than 1 percent.

Drug Types

HSSS provides data on a wide range of drug types: marijuana and hashish, cocaine, heroin and other opiates, hallucinogens, inhalants, stimulants, sedatives, tranquilizers, alcohol, and cigarettes, as well as a combined score for any use of illicit drugs. These data are published by lifetime, past-year, and past-month use.

Statistical Techniques

As with NHSDA, the principal investigators of HSSS have used statistical tests of significance (z-tests) to determine whether there have been meaningful score changes between survey administrations and meaningful drug trends.

Limitations

Self-Report

Since the accuracy of high school senior self-reported drug use has not been compared adequately to any objective criteria, particularly during this current period of less-permissive social attitudes about drug use, the validity of student reports has remained open to at least some speculation. Two issues of concern have focused on student reports of honesty and loss of anonymity. On the positive side, it should be pointed out that a wide array of inferential evidence supports the current findings.

Student Reports of Honesty. Since 1979, the principal investigators have tried to judge the honesty of subject self-reports by asking the question, "If you had ever used (insert name of drug), do you think that you would have said so in this questionnaire?" Reference is made to three specific drug types: marijuana or hashish, amphetamines, and heroin.

Answers were similar for all three drugs: approximately one of every five respondents who did not report any lifetime use indicated that they either would not reveal this information (if they had used the drug) or were "not sure" that they would provide an honest answer. This approximate 20-percent rate across each of the three drug types has been consistent every year from 1979 to 1990 and may indicate student drug use underestimation on HSSS.

The conclusion regarding underestimation must remain tentative, however, because of a nonlogical response pattern evident in the data. Among respondents indicating that they have used heroin during their lifetime, 16 percent indicated in both 1985 and 1989 that they would not reveal this information on the survey form; of respondents reporting the use of amphetamines in 1990, 7.7 percent indicated that they would not reveal this information; 5.2 percent gave a similar response for marijuana in 1988. The investigators hypothesize that since these questions come at the end of a long questionnaire, there may have been a greater than usual number of random or careless responses. The degree of trust to put in the 20-percent rate is therefore in some doubt.

Loss of Anonymity. Unlike NHSDA, which includes procedures to assure respondents that their answers can never be traced back to them, HSSS does just the opposite. In fact, student subjects are told on the cover page of HSSS that their responses will not be anonymous. They are asked to provide their name, mailing address, and phone number as well as the name and address of a contact person so that follow-up surveys after high school can be conducted.

The degree to which loss of anonymity has compromised the accuracy of student response patterns is uncertain. There is not an extensive literature on the contributions of anonymity to student reporting of the use of illicit drugs, at a time of increasing societal pressures against their use. The anonymity literature that does exist has proven to be conflicting.

However, there is reason to believe that the effects of anonymity may not be extensive, at least for drugs that carry minimal social disapproval. This is because of the high positive drug use rates reported. Between 1988 and 1990, at least 80 percent indicated the use of alcohol, and approximately 30 percent indicated the use of marijuana or hashish during the past year. Overall, more than 30 percent of the participating students admitted to using an illicit drug within the past 12 months.

Positive Inferential Findings. A number of reasons suggest—if they do not prove—that self-reports are valid, according to the study investigators: (1) the high level of drug use being reported (in 1990, the lifetime rate of the use of illicit drugs was indicated to be 47.9 percent); (2) replication of results across multiple cross-sections of the sample; (3) the high degree of data consistency over the years (despite using new subjects on each survey administration, the curve tends to be smooth rather than peaked); (4) the same rate of missing data on questions related to the use of illicit drugs and nondrug use (about 2 percent); (5) friend's level of drug use highly correlated with one's own (there should be less motivation to conceal a friend's use); (6) a negative correlation between drug use reporting and both academic performance and religiosity; (7) in the high school follow-up, an expected correlation between drug use and pregnancy, military service, and living arrangement; (8) a decrease in reported drug use as perceived drug disapproval increases; and (9) the fact that different drugs show varying trends, demonstrating that students are not answering similarly across all drug use items.

Exclusion of High School Dropouts

By design, dropouts have not been included in the sampling frame of HSSS since the inception of the study in 1975. Since they are thought to have higher rates of drug use than students in school, this implies an underestimation of overall use rates among high school seniors.

To deal with this issue, the principal investigators sought to estimate the drug use rate among dropouts for 1977, 1979, and 1981, utilizing a secondary data analysis approach, and then to estimate the dropout bias by comparing HSSS drug use rates including and excluding dropouts. The investigators claim that as long as there is no major change in the dropout rate, and dropouts do not demonstrate markedly different drug use trends from those in school, collected HSSS data should reflect entire class trends. Of the 11 researchers we interviewed on this topic, 9 expressed concerns regarding the assumptions and procedures in the reanalysis. The dropout effect on school drug use data therefore still remains to be clarified. (Dropout adjustments are not included in yearly HSSS publications.)

Exclusion of School Absentees

The HSSS field staff does not engage in follow-up visits to schools because of cost and logistics. As a result, students absent on the day of the survey administration are excluded from participation. According to the coprincipal investigators, absentees constitute approximately 17 to 23 percent of enrolled students. HSSS is therefore missing about one in five students because of absenteeism.

The investigators have attempted to correct for the omission of absentees. Using 1981 HSSS data, they estimated absentee drug use rates by first grouping participating seniors with absentees based on their common absentee records during the past 4 weeks. Then adopting a weighting procedure corresponding to the various levels of absence, the investigators were able to determine that absenteeism created minimal bias in the results across all drug types (annual and monthly drug use statistics did not change by more than 3 percent). Their correction, however, depends upon absenteeism being a fairly random event. This remains to be demonstrated. (Absentee adjustments are not included in yearly HSSS publications.)

School Participation and Replacement

The school participation rate has tended to be between 60 and 80 percent, typical of consent rates achieved in other student-related studies. Schools choosing not to participate have been replaced by other schools in the same district when possible, or within the same PSU.

Since school officials do not indicate school drug problems as a reason for nonparticipation, the assumption has been made that no drug bias occurs in the school replacement process and that replacement is basically a random event. This conclusion, while plausible, has never been empirically proven.

According to a project official at the University of Michigan, external indicators of drug use from each school would need to be examined to determine whether nonparticipating schools were, indeed, different from their replacements. HSSS has not done this; gathering such data would be time-consuming and costly and could have a detrimental effect on the school participation rate.

Minority Drug Use Estimates

Drug use estimates for nonwhite seniors have traditionally not been reported yearly in HSSS press releases and publications. In 1990, the investigators provided a report on the prevalence, trends, and correlates of drug use among black, Hispanic, Native American, and Asian American high school seniors between 1976 and 1989. These results must be interpreted with caution.[2]

The smaller population size of nonwhites, coupled with their clustered attendance in a limited number of schools, increases the sampling error involved in studying nonwhite drug use rates and affects the reliability of the data obtained. In addition, no safeguard procedures were adopted to ensure the representativeness of these sampled groups.

Heroin Use

The principal investigators indicate that the survey's heroin use data should be assessed with extreme caution for three reasons: the relatively few cases make estimation "relatively unreliable"; most heroin users tend to drop out of school and are, therefore, underrepresented in the sample; and the heroin users who do participate tend to be "very occasional" users.[3]

Drug Use Forecasting

Strengths

Objective Procedures to Determine Drug Use

For criminal justice systems engaged in the development and implementation of drug control strategies aimed at crime reduction, prison management, and treatment, access to information about current and changing patterns of arrestee drug use can be very beneficial. For booked arrestees awaiting arraignment, however, there is no inherent benefit to be truthful about their drug use. Thus, it is to DUF's credit that it has implemented an objective urine drug testing procedure in the study protocol in addition to the individual's self-reported drug use.

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[2] Jerald Bachman et al., "Drug Use Among Black, White, Hispanic, Native American and Asian American High School Seniors (1976-1989): Prevalence, Trends, and Correlates," Monitoring the Future Occasional Paper 30 (Ann Arbor: Institute for Social Research, University of Michigan, 1990), p. 2.

[3] Jerald Bachman et al., Monitoring the Future: Questionnaire Responses From the Nation's High School Seniors: 1988 (Ann Arbor: Institute for Social Research, University of Michigan, 1991), pp. 8-9.

The EMIT urine screen has been implemented across all DUF sites. Standard cut-off levels are employed for each of 10 drug types, and confirmation of positive amphetamine screens is conducted using accepted gas chromatography techniques to minimize false positives based on over-the-counter drugs.

A comparison of objective test results and self-reports for 1988 and 1990 indicates sizable disparities across sites in positive drug use rates for cocaine. While unfavorable interview conditions may account for part of the disparity, the urinalysis positive rate for cocaine has been shown to be between approximately 50 and 350 percent higher than self-reported findings in 20 sites. This supports the use of the urinalysis technique.

Subject Participation Rates

Gaining the participation of high-risk target groups can be problematic, given issues of location, access, compliance, education, and trust. DUF overall urinalysis participation rates among booked arrestees have been high. According to an evaluation of DUF prepared for NIJ, for the period 1987 through 1989 (based on 21 reporting sites), the urinalysis participation rate was 88.7 percent for arrestees providing an interview.

Centralized Laboratory

To reduce the possibility of biased test results, DUF has required sites to submit their urine specimens to a centralized laboratory (21 of 23 sites were in compliance in 1990). The approved laboratory must be licensed under provisions of the Clinical Laboratories Improvement Act of 1967 and must be certified by NIDA. The use of a central facility can minimize discrepancies that might result from different laboratory procedures and staffing regimens.

Availability of Local Drug Use Data

Drug use data are not widely available at the local level, hampering the development of more effective drug use policy and substance abuse program interventions. NIJ's purpose for instituting DUF was to help fill that void, by creating localized criminal justice programs for determining and monitoring booked arrestee drug use patterns and trends. DUF data now make it possible for local policy planners and decisionmakers to obtain specific drug use information on booked arrestees in the participating sites.

Local DUF data are collected on the following types of variables useful to policy planners: the arrestee's background demographic characteristics, most serious criminal charge at the time of arrest, major illicit and licit drugs ever tried and used in the recent past, routes of drug administration (particularly needle use), perceived need for or dependence on particular drugs, past use and current need for alcohol or drug treatment, and knowledge of new drugs appearing on the street.

DUF as a Community Indicator

In Washington, D.C., DUF data have been shown to be good predictors of drug-related emergency room episodes, drug overdose deaths, crime, and child neglect, using computer-simulated modeling procedures.[4] This demonstrates DUF's potential benefits beyond assessment of just booked arrestee drug use patterns and trends.

Limitations

Booking Facility Variations

DUF conducts self-report interviews and urinalysis collection procedures at central booking facilities. But participating facilities often encompass very different areas. Some serve an entire city, others part of a city, a central city plus additional cities, an entire county, or parts of a county. Such differences are not made clear in DUF publications (for example, DUF annual report tables have listed arrestee drug use data under city headings, giving the impression that the results characterize the entire city when this is not the case). In addition, some city and county-based facilities do not serve the entire geographic unit (for example, the Manhattan central booking facility does not serve all of New York City nor the entire borough of Manhattan; the Philadelphia central booking facility does not cover four precinct areas within the city of Philadelphia).

This raises an external validity issue: to what degree can these partial area findings from DUF data be generalized to the area as a whole, and, consequently, to what degree can policy or programs be developed for the area based upon these more limited data sets? There is no evidence to support generalizing partial data to an entire city or county. During one single 3-day period in July 1991, an NIJ contractor determined that 12 percent of the Manhattan booked arrestees were not being booked at the Manhattan central booking facility. In 12 other sites throughout the country, arrested persons had the potential of being booked at facilities not served by DUF interview teams. Cities and counties should therefore exercise caution in using these partial data for overall city and county policy and program development.

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[4] Harrell and Cook caution, however, that their computer-simulated results were obtained for only one city, during one period in time (April 1984-June 1988), under controlled situations that might not be present in all jails and lockups, using sampling techniques that may not be operational at each site, and using only drugs for which there were rapid prevalence changes (i.e., cocaine and PCP). Further empirical testing of DUF as a community indicator at other sites and under varying conditions would be useful. (See A. Harrell and R. Cook, "Validation of the Drug Use Forecasting (DUF) System: Executive Summary," submitted to Drugs and Crime Research Program, National Institute of Justice, Washington, D.C., February 1990.)

Even using DUF data that have been collected from booking facilities encompassing an entire city or county may potentially be problematic for policy and program development, since it has not been shown that DUF data collected from each facility can be generalized to all booked arrestees in that respective area.[5] Caution is warranted in using these data to determine booked arrestee drug prevalence rates.

Structural and arrestee housing differences between booking facilities can also lead to different types of respondents being interviewed. "Some booking facilities have no capability to house arrestees longer than a brief period for completing necessary paperwork and/or court processing . . . other facilities are jail intake centers where both new arrestees and sentenced prisoners arrive through the same doorways."[6] Four of the 12 applicable sites (New Orleans, San Antonio, San Diego, and Washington, D.C.) indicated that they would exclude already sentenced male prisoners from participation in the DUF interview situation; the remaining 8 sites were willing to consider such persons.

The actual number of participating sentenced prisoners is unknown. But it clearly raises the question as to whether all DUF participants are newly booked arrestees. From a quality assurance perspective, we believe that it would be useful for NIJ to clearly specify the target population and take steps to ensure that only that group is being sampled. Otherwise, contaminated findings can result.

The Subject Sampling Procedure

DUF uses a convenience sampling approach for obtaining subjects. Participating sites do not use a random sampling or probability selection procedure. DUF interview teams have been impeded in selecting more systematic, generalizable samples by not having access to a "master list" of all detained arrestees, with background demographic and criminal histories. The busy world of police booking centers is not generally set up to provide such items of importance to the research community. Thus, sites have neither selected arrestees in the most appropriate fashion to avoid bias nor have they determined the extent of bias among individuals not chosen for participation.

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[5] See particularly table 8 of the NIJ contract study, J. Chaiken and M. Chaiken, "Analysis of the Drug Use Forecasting (DUF) Sample of Adult Arrestees," report to the National Institute of Justice, Lincoln, Mass., October 1992.

[6] J. Chaiken and M. Chaiken, "DUF Sites' Sampling Procedures For Adult Arrestees," report to the National Institute of Justice, Lincoln, Mass., October-December 1991, pp. 2-3.

DUF has implemented what is referred to in the February 1990 manual as the 20-percent rule: "every fifth interview should involve an arrestee charged with a drug offense."[7] While this rule was designed to permit a greater number of arrestees not charged with drug offenses to be interviewed, the consequences can be of two types: it can promote an underestimation of the actual drug use rate if the number of persons charged with a drug offense exceeds 20 percent, or it can promote an overestimation of the drug use rate if one out of every five interviews is with a drug offender, despite the fact that the actual drug offense rate is lower. Sites have handled this 20-percent cap differently; there is no standard procedure for selecting drug offense arrestees.

DUF "recognize[s] that this procedure might result in a charge distribution of arrestees in the DUF sample that differs from the charge distribution of all arrestees in a given city."[8] Chicago is a case in point. DUF and Uniform Crime Reports (UCR) 1988 male arrestee rates, by type of crime, have been contrasted. The DUF sample charged with the sale or possession of drugs is twice the UCR rate (26.7 versus 14.6 percent).

Inclusion and Exclusion Criteria

A review of DUF fieldwork procedures indicates that standards are not applied uniformly across sites in selecting arrestees. According to the Drug Use Forecasting Program Procedures Manual of February 1990, male arrestees are to be selected according to a rank order of criminal charges: nondrug felony charges, nondrug misdemeanor charges, drug felony charges, drug misdemeanor charges, and warrants for any charge. But local DUF operational procedures and police booking procedures put limits on the types of arrestees to be interviewed. In San Diego, the local DUF operating team eliminates misdemeanor arrests. Similarly, in Miami (and previously in Birmingham), only male felony charges are considered. In Manhattan, the police department minimized the number of misdemeanor arrestees who could be seen by limiting the booking of such individuals. For females, there is no such priority ordering. All charge categories are acceptable to meet the NIJ female sampling goal of 100 participants per quarter.

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[7] National Institute of Justice, Drug Use Forecasting Program Procedures Manual (Washington, D.C.: February 1990), p. 7.

[8] National Institute of Justice, "DUF Estimates of Drug Use Applied to UCR," Drug Use Forecasting Research in Action Report (Washington, D.C.: January-March 1990), p 7.

There is also some concern about the reliability of the DUF charge data. Of 48 felony arrests in Birmingham that were followed up on-site by contractors Chaiken and Chaiken, 17 were recorded by the DUF team as misdemeanors (35 percent); 2 of 12 misdemeanor arrests were classified as felonies (17 percent). In part, this discrepancy can be attributed to a charge reclassification of arrestees after leaving the DUF area. But if the number of these discrepancies is sizable, it can cast doubt on DUF distributions of drug use by criminal charge.

To meet the goal of approximately 225 male interviews per quarter, DUF has permitted the data collectors in Omaha to interview all male arrestees, regardless of charge, because of the small number of arrests per week at that site. This limits comparability between Omaha and the other sites. It also implies a relaxation of the sampling procedure protocol just so Omaha can obtain the 225 males per quarter.

The DUF manual calls for the exclusion of males arrested for vagrancy, loitering, and traffic violations (for example, DWI, driving while intoxicated, and DUI, driving under the influence). Nevertheless, the contracted assessment of DUF found 3 sites that would permit the inclusion of male DWI-DUI arrestees in the sampling strategy (Cleveland, Fort Lauderdale, and Omaha); 6 sites that permitted "other traffic" violators to be included (Fort Lauderdale, Los Angeles, Manhattan, Omaha, Philadelphia, and Phoenix); and 7 sites that allowed for the sampling of "other vagrants/loiterers" (Cleveland, Detroit, Fort Lauderdale, Kansas City, Los Angeles, Manhattan, and Omaha). From a quality control perspective, sites should not even be considering these excluded male offense charges. Fortunately, 1989 and 1990 DUF data indicate that less than 5 percent of males sampled from each site are included because of traffic violations. A DUF official has indicated a similarly low percentage for vagrancy and loitering. Since there are no charge restrictions on female participants, 1990 female data demonstrated 8 sites in which traffic offense inclusion equaled or exceeded 10 percent.

Individuals arrested for crimes committed while in custody, in court, in jail, or at a detention camp are considered for DUF participation in 6 sites (Denver, Detroit, Fort Lauderdale, Houston, Indianapolis, and Kansas City). Other sites either have no access to these arrestee types or exclude such individuals from participation. While the number of such subjects is expected to be relatively small, actual frequencies are not available.

Local criminal justice systems must therefore be acutely aware of the sampling design used within their particular site, so that findings will not be inappropriately applied. Opportunities for comparative analysis across sites are also hindered as a result of this diverse selection process.

Privacy in the Interview Situation

Not all facilities use a private office for arrestee interviews. In some facilities, privacy may be compromised because of the physical proximity of the holding cell and the need for police security. Subjects have been interviewed in hallways traversed regularly by police department personnel (Manhattan, San Diego); in small alcoves, with a police officer standing guard at the entrance (Philadelphia); or through the bars of a holding cell, in close proximity to other arrestees (Chicago, Washington, D.C.). Under such conditions, there is a potential for underreporting drug use, particularly since arrestees are awaiting arraignment before the judge. (Though pledges of confidentiality are always given, arrestees may not fully believe them.) Urinalysis rates, however, should not be affected.

Statistical Analyses

NIJ cannot provide ongoing tests of statistical significance in the DUF reports because of convenience sampling. Evaluators of the data are thereby unable to determine whether decreasing or increasing drug use scores represent statistically significant shifts in actual drug use. An individual's conclusions about drug use patterns and trends must therefore rely on intuitive reactions rather than being statistically based. The development of more rigorous sampling methods would permit statistical testing of score differences.

Staffing Issues

DUF maintains a skeleton central administrative staff. Data gathering operations, data entry, and a subset of the training coordination functions have been contracted out. We judged a prime DUF trainer to be particularly lacking in survey research experience, thereby having a reduced capability to train DUF site staff and oversee technical functions being performed by contractors.

NIJ has augmented its DUF staff in several ways. It has established a research advisory board and a methodology committee of federal and nonfederal experts, and it has contracted for specific tasks such as reviewing site methodologies and examining the ability to generalize from DUF data.

Reporting of Medically and Nonmedically Prescribed Drugs

The DUF self-report does not distinguish the use of medically prescribed from nonmedically prescribed drugs. In addition, there is no current way to differentiate the prevalence of the illicit versus licit use of drugs in urine tests for the amphetamines, benzodiazepines, barbiturates, and propoxyphene (Darvon). This inhibits the comparison of DUF data with other drug studies in which such differentiations are made, unless one assumes that booked arrestees (whether on their own or through the penal system) have not received prescription orders. This remains to be demonstrated.

Overall Conclusions

NHSDA has been the model study for collecting national household data on drug use since 1972. It considers all major illicit drugs in addition to nonmedically used psychotherapeutics, alcohol, cigarettes, and anabolic steroids. Its drug use estimates, however, should be regarded as conservative approximations of the national drug prevalence rate, since the study has traditionally excluded several groups at high risk for drug use, depends upon the validity of subject self-reports, and has demonstrated nonresponse rates in the range of 20 to 30 percent (varying among age, sex, and race subgroups).

In the case of heroin, NHSDA has proven largely unsatisfactory as an indicator of use. Past-month usage rates remain imprecise and are not published; past-year usage data have been published only since 1991. But imputation and weighting procedural problems meant that the 1991 count was overestimated by 320,000. Most fundamentally, NHSDA is a poor tool for heroin measurement since heroin users frequently do not live in stable household environments of the sort sampled. NHSDA does not therefore serve as a good measure of current heroin patterns and trends.

NHSDA cocaine prevalence measurement in recent years is also problematic. The 1991 prevalence rate had to be revised downward by 200,000, the 1990 past-month estimate relies heavily on suspect imputation procedures, and the 1988 rate does not reflect large cocaine nonresponse patterns in geographic areas of 10 percent or greater drug use. To date, however, NHSDA provides the only national estimate of household cocaine prevalence rates available.

Yearly administration of NHSDA does not appear to be useful enough to justify its sizable cost (approximating $11 million to $13 million per survey administration between 1991 and 1993), especially in view of the minimal drug prevalence change between previous 2-to-3-year survey administrations, and the inability to survey high-risk groups.

HSSS stands as the premier model for the national study of high school senior drug use patterns and trends. Since 1975, 15,000 to 19,000 high school students have participated each year from 120 to 140 public and private high schools. HSSS drug use results, however, should also be considered as conservative estimates of the national drug prevalence rate among high school seniors because of reliance on subject self-reports and omission of dropouts and absentees. The investigators have introduced correction factors for these omissions in a special study and believe their effects to be minimal, but research experts we interviewed expressed concern about the dropout measurement procedures adopted.

HSSS has not adequately measured drug use among nonwhite population groups, owing to their relatively small sample size and clustered school enrollments. Heroin use rates among school-age youths are also thought to be underestimated, given social disapproval of this drug among school peers and the expected higher use rate among dropouts. Approximately one in five students indicating nonuse responded that they either would not reveal this information (if they had used the drug) or were "not sure" that they would provide an honest answer. The same proportion held for marijuana and the amphetamines. This could indicate a sizable drug underreporting rate, were there not problems with the "honesty" measurement instrument. The degree of drug underreporting must therefore await further study.

Unlike NHSDA and HSSS, DUF was not designed to determine national drug use rates among booked arrestees. Its purpose has been to help guide policy development and program intervention at the local level. Its particular strength lies in the fact that it does not rely solely upon subject self-reports; urinalysis procedures have also been adopted in tests of arrestees for recent drug use. Results reveal wide discrepancies between objective urinalysis data and arrestee self-reports, supporting the notion that self-reported data may not be valid for booked arrestees awaiting arraignment.

Methodological limitations, however, compromise the overall utility of the DUF study. Although cities are reported in DUF publications, DUF data collection does not always reflect these geographic parameters. Convenience sampling impedes the generalization of sample results to both the central booking facilities used and the geographic areas surveyed. Different subject inclusion and exclusion procedures limit comparability across sites and between males and females. A lack of statistical tests of significance limits the ability to judge whether drug use rates and trends are meaningful or chance occurrences.

Chapter 4

Improving Drug Prevalence Estimates

In this chapter, we provide specific recommendations for the improvement of drug prevalence measurement. They are discussed under two areas: enhancing NHSDA, HSSS, and DUF and developing new methods for reaching high-risk groups.

Enhancing NHSDA, HSSS, and DUF

The Self-Report Technique

NHSDA and HSSS rely entirely on self-reports of drug use. But how accurate are such data? Are illicit drug use rates actually decreasing to the extent published in NHSDA and HSSS? Or are societal influences affecting self-reported data? In fact, the degree of accuracy of self-reported drug use in the general community remains to be determined.[1] It is therefore important to check these self-report responses against more objective measures. When objective tests are not feasible, it would be useful to continue checking the accuracy of self-reports in "honesty-related" survey questions and correlational studies, given the continually evolving social opinion about drug use.

Hair Analysis

Urinalysis is one of the most widely recognized and utilized objective measures of drug use. Unfortunately, the urinalysis EMIT test can detect only very recent drug use (usually within the past 12 to 96 hours, except for marijuana). The test therefore would not help check the accuracy of either past-month or past-year NHSDA and HSSS self-reported drug use.

Hair testing has received publicity both in the United States and abroad because of its potential to distinguish the use of illicit drugs in hair specimens for extended periods of time. Hair testing for illicit drugs, however, is still relatively new. Threats to accurate measurement and inference still exist.[2]

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[1] In this context, it should be pointed out that of 11 researchers we queried about prevalence issues, only 4 judged the self-report data from NHSDA to be accurate within 10 percentage points, for all user groups, during most study periods (3 additional researchers thought the data were accurate within 10 percentage points for casual and recreational users but not frequent, hard-drug users). Six of 11 judged the self-report HSSS data to be accurate within 10 percentage points for all user groups (with one additional researcher judging it to be accurate for casual, recreational users but not frequent, hard-drug users). Seven of 11, however, believed that NHSDA accurately reflected the drug trends of the groups being studied; 9 of 11 gave a similar response for HSSS.

[2] Research issues relate to the effect of passive exposure and environmental contamination, the ability of washing procedures to eliminate environmental contaminants, adhesion of the drug to varying hair types, effect of hair treatments on drug removal, and the relationship of drug dose to resulting hair drug levels.

Although recognizing the need for further scientific study of hair analysis, we endorse its field trial use in community drug prevalence measurement studies, for the following reasons: (1) multiple independent studies have demonstrated that illicit drugs can be detected in the hair, (2) National Institute of Standards and Technology tests have demonstrated that laboratories can identify drug residues in hair specimens with a high rate of success, (3) the Federal Bureau of Investigation chemistry and toxicology laboratory has been working with illicit drugs regularly for several years and has not found passive exposure or environmental contamination to be a practical concern for cocaine, (4) NIDA's Division of Epidemiology and Prevention Research proposed that exploratory hair testing be adopted in the 1992 NHSDA, (5) several prominent laboratory and social science drug researchers have endorsed self-report validity testing using hair analysis, and (6) a Food and Drug Administration official saw no problem in conducting exploratory self-report validation research studies, as long as specific radioimmunoassay (RIA) hair kits were used and the information derived was not used for product marketing and clinical assessments.

This does not mean that we are endorsing the use of hair analysis for decisionmaking at the individual level (as in employment testing and court testimony). Maximal testing precision would be required in such instances. At present, we are concluding only that the method has enough merit for use in field trials to determine the general level of agreement between self-reports and hair analysis in anonymous survey situations. Four of the drug types that can currently be detected in laboratory hair assessments include cocaine, the opiates, PCP, and the amphetamines.

A randomized field trial of approximately 2,000 subjects could be selected to mirror the NHSDA sample, covering persons of varying age groups, sexes, and racial and ethnic backgrounds. Such a study would not only help determine the degree of association between hair analysis and self-reports for multiple subsets of the population but would also shed light on the feasibility of obtaining hair samples from various population subgroups and the incentive payments needed to ensure cooperation.

We estimated the costs of two different trials, each including a $30 payment incentive per subject. The first would involve an initial RIA screen and gas chromatography/mass spectrometry (GC/MS) confirmatory test (only for individuals testing positive on the screen). This is a typical laboratory procedure. The second more conservative approach would be to use the more sensitive GC/MS test on all individuals, without a screen, but test only for cocaine and the opiates (given the higher cost). The trials would cost approximately $146,000 and $240,000, respectively. (Appendix I presents further details on the cost estimates given here.)

If hair analysis and self-report data on the same group of individuals showed comparable drug use patterns, we would have powerful evidence to support further reliance on self-reports (the cheaper, more flexible, less intrusive technique to implement). Findings of substantially higher drug use rates from hair analysis would raise questions for further review, as those results would imply one or more of the following: subject underreporting, inappropriate laboratory assessments and cutoff levels, and passive exposure or external contamination.

"Honesty-Related" Survey Questions

In the absence of objective validation techniques, honesty-related questions may help estimate levels of under- (or over-) estimation in the data and the applicable groups involved.

In HSSS, of those who said that they had not used certain drugs, approximately one in five also said that they either would not tell the truth if they had used the drug or were unsure that they would do so. While problems with the HSSS honesty questions have been discussed, the technique should not be dismissed out of hand. Alternative strategies might resolve the problems. We believe researchers should consider (1) asking these questions at a different point in the survey administration (they are currently placed at the end of the survey, when respondents may be less attentive), (2) modifying the wording of these questions so as to emphasize the importance of the results, and (3) ensuring that the wording does not cause confusion or uncertainty. Cognitive laboratory review and field testing could achieve these ends.

Correlational Studies

Where direct validation of a particular study's results proves infeasible, an indirect validation technique is available. This involves comparing results from a specific study with other similar studies to determine if findings are related in expected directions. Highly correlated findings across a majority of studies would provide greater confidence in the results. The HSSS self-report inferential work (discussed in chapter 3) represents a fine example of this approach.

Given these considerations, we recommend that the Secretary of Health and Human Services give high priority to developing, field testing, and routinely implementing subject self-report validation studies of the use of illicit drugs, particularly focusing on objective techniques such as hair testing.

The Number of Nonwhites in the HSSS Sample

Yearly HSSS reports have typically not included drug prevalence results for nonwhites. The policy implications are at least fourfold: (1) the overall drug use rate among nonwhite high school seniors is unclear; (2) it is impossible to discern whether the drug use rate is more prominent among specific nonwhite subgroups in certain delimited areas; (3) subsequent to policy and program implementation, it is impossible to determine whether the nonwhite high school senior drug trend has been decreasing, increasing, or remaining stable; and (4) the exclusion of nonwhites may affect the total high school senior drug use rate.

In NHSDA, the investigators have developed a stratified sampling design to ensure that whites, blacks, and Hispanics are all included in the study. This stratification approach has not been adopted in HSSS. No racial and ethnic criteria are specified in the initial school selection process. Because of the smaller number of nonwhites in the HSSS population and their attendance in a limited number of schools, the sampling error is increased and the reliability of the data is questionable.

Therefore, we recommend that the Secretary of Health and Human Services incorporate methodological design changes into HSSS so that nonwhite individuals are adequately sampled.

Frequency of Data Collection

Since its inception in 1975, HSSS has been conducted annually. Since 1990, NHSDA has also been conducted annually. The utility of conducting these surveys each year, however, bears review.

With respect to NHSDA, four principal reasons guide this reconsideration. First, prior to 1990, NHSDA had generally been conducted every 2 to 3 years; during the history of the survey (1972-90) there was only one period in which an age group increase in past-year use of illicit drugs of greater than 4 percentage points between survey administrations could be found.[3] Second, the 1991 budgeted cost for administering the survey was sizable: $11.5 million. The 1993 budget is expected to exceed $12 million. Third, many of the targeted groups of interest to the Congress do not generally live in traditional household environments. Fourth, the validity of self-reported data is questionable.

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[3] Between 1977 and 1979, 18-25-year-olds showed increases of greater than 4 percentage points in past-year use for marijuana and cocaine. Marijuana increased from 38.7 percent to 46.9 percent; the cocaine rate increased from 10.2 percent to 19.6 percent.

By conducting the survey less often, time can be allotted in interim periods for other NHSDA tasks related to measuring drug use: more in-depth analysis of already collected data; publication of results beyond the standard tables provided in the Main Findings; review of manual and statistical editing procedures (for example, logical and statistical imputation); further cognitive laboratory studies; pretesting of new survey-type questions (for example, on drug dependence and mental illness); and instrument modifications, as warranted.

Four similar points can be made with respect to HSSS. First, a review of the 1975-90 data indicated that during the 16 consecutive years of the study, there were only two increases of greater than 4 percentage points in the past-year use rate of illicit drugs.[4] Second, groups at higher risk for drug use have not participated (for example, dropouts and absentees). Third, frequent users of heroin are conspicuously absent. Fourth, the survey depends upon the uncertain validity of the self-report technique.

The Public Health Service Act, as amended by the Anti-Drug Abuse Act of 1988, requires that survey data be collected each year on the national prevalence of substance abuse, including "the extent of alcohol and drug abuse among high school students and among the general population." While no specific survey instruments are directly indicated in the act, HSSS and NHSDA presently represent the survey technologies typically identified with national studies of substance abuse patterns and trends among high school students and the general population. Given the cost, effectiveness issues currently related to the yearly collection of NHSDA and HSSS data, and the lack of clarity regarding the utility of conducting the same or other surveys annually in subsequent years, we recommend to the Congress that part A of title V of the Public Health Service Act (42 U.S.C. 290aa et seq.) be amended to require the Secretary of Health and Human Services to collect survey data biennially, rather than each year, on the national prevalence of the various forms of substance abuse among high school students and among the general population. But if local or regional indicators portend an increase in drug use, the Secretary shall have the authority to initiate new or augment current studies to determine the nature and degree of the problem.

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[4] In 1975-76, the marijuana past-year use rate increased from 40.0 percent to 44.5 percent; the stimulant use rate increased from 20.8 percent in 1980 to 26.0 percent in 1981.

Generalizing DUF Sample Data

Published DUF data using the urinalysis technique have revealed high rates of drug use among booked arrestees. But it has not been shown that DUF findings can be generalized to each of the participating geographic sites identified in the 1988-90 DUF annual reports. In a strict sense, then, policymakers must exercise caution in using these data for the development and assessment of citywide criminal justice interventions.

The development of findings that can be generalized requires several stages of decisionmaking. First, the geographic unit of study must be clarified (if cities are the relevant unit, then county data from outside city boundaries must be excluded; if the DUF booking center catchment area is the relevant unit, then the resulting data must be more clearly labeled and the limitations explicitly described). Second, central booking facilities must be chosen that adequately represent a cross-section of the arrestees being detained in that geographic unit (this may involve the selection of one or more booking facilities). Third, a sample must be obtained from each booking facility to yield an appropriate cross-section of that facility's arrestees.

We recognize that such efforts may not be easy to implement, given that the needs of police departments may often be in conflict with those of the criminal justice research community. But if DUF data are now handicapped by the sampling procedures, improvements are possible. At stage three, for example, several alternatives are available for consideration: (1) work with police departments toward generating a master list of all booked arrestees being held in the booking facility; clarify whether the criminal or demographic background status of sampled arrestees matches that of detained arrestees; (2) hire additional staff so that most, if not all, detained arrestees are interviewed during a given period (as has been shown to be feasible, for example, in Washington, D.C.); (3) increase the number of interviews per quarter if it is clear that 100 female and 250 male interviews do not adequately describe the cross-section of arrestees being housed in the facility in sufficient depth.

Therefore, we recommend that the Director of the National Institute of Justice give priority in the DUF study to creating an arrestee data base that can be generalized to booked arrestees in the 24 geographic sites specified. The specific physical area covered should be detailed for the consumer in DUF publications.

Standardized DUF Procedures

A DUF-contracted review has revealed the lack of standardized operational procedures across participating DUF sites, in terms of both geographic study units and subject sampling procedures. At least 6 booking centers serve entire cities, 6 parts of cities, and 5 counties. San Diego and Miami consider only male felony arrests, while Omaha has been permitted to consider all male arrestees regardless of charge. Eight facilities consider sentenced prisoners; 6 consider individuals committing crimes while in custody, court, or jail or at a detention camp, in addition to differential male-female inclusion criteria and police booking procedures.

Lack of standardization at the very least must raise questions of data interpretation at the local jurisdictional level since NIJ does not elaborate on methodological site-specific differences. The lack of standardization inhibits cross-sectional comparative analyses between sites and can limit the application of trend analyses over time if booking facility conditions are allowed to vary.

While it is understood that the fast-paced, hectic world of a central booking facility is not an ideal climate in which to collect scientific data, we recommend to the Director of the National Institute of Justice that the practicality of improving the DUF design be reviewed, determining the feasibility and costs of implementing a more standardized data collection system.

To illustrate, NIJ should consider (1) what police department impediments there may be to trying to establish a more systematic sampling procedure (that does not rely on convenience sampling and weeds out arrestees charged with excluded crimes), (2) what additional resources would be necessary to develop an appropriate citywide data base across sites (so as to reflect objectives stated in the DUF annual reports), (3) how many more booking facilities must be visited to obtain misdemeanor data in all DUF locations, and (4) how much extra staff, time, and costs would be incurred by having females meet the same inclusion criteria as males. A cost-benefit analysis would then be appropriate for determining the kinds of changes most applicable to the DUF program.

Adapting NHSDA at the State Level

ONDCP has been interested in conducting NHSDA at the state level in order to obtain more detailed data for planning and evaluating drug control strategies. An ONDCP official has argued that reliance on the collection of national data can mask important drug use trends in different parts of the country that deserve attention. In a prior report, we recommended that the states improve the management of their federally funded drug abuse programs by using state-level prevalence data.[5]

The best way to meet these data needs at the state level is not clear, however. NHSDA would be an expensive tool (NIDA and Health and Human Services (HHS) officials estimated that expanding the sample to allow state-by-state prevalence estimates would cost approximately $110 million) and would not currently constitute a useful indicator of some of the more serious drug use problems, as indicated above.

An alternative approach, called the State Systems Development Program (SSDP), may prove useful for collecting state-level drug use data and deserves sufficient time for trial and evaluation. SSDP is administered by the Center for Substance Abuse Treatment (CSAT), part of SAMHSA in HHS. In fiscal year 1992, 13 states received funds to conduct drug needs assessment studies, including the determination of drug prevalence rates. Over 3 years, approximately $52 million has been requested to enhance the state-level drug abuse data collection system. Each state has submitted its own design plan for data collection; there is no centralized model that all states have to adopt except that information must be collected on a core set of standard variables.

We believe it would be useful to establish the following two objectives. First, to test the feasibility of collecting comparable data across states, HHS might want to consider providing technical assistance in the form of a limited number of study design models, instruments, and data collection procedures, along with sufficient help for meeting stated goals. Second, to assess the strengths and limitations of the SSDP program, HHS could formally evaluate the SSDP data collection effort and reporting process, including the cost of the design variations and the utility of reported data to potential consumers. We recommend to the Secretary of HHS that the current design of NHSDA be retained to provide national drug use estimates (and that the NHSDA design not be expanded to provide state-level estimates of drug use).

Developing New Methods for Studying High-Risk Groups

Since NHSDA and HSSS do not sufficiently measure drug use among high-risk target groups, supplementary methods must be conceptualized, field-tested, and implemented if we are to better understand the drug prevalence rates and trends among these groups.

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[5] U.S. General Accounting Office, ADMS Block Grant: Drug Treatment Services Could Be Improved by New Accountability Program, GAO/HRD-92-27 (Washington, D.C.: October 1991).

Until recently, only modest efforts were being made in this area. But momentum is now building. We have already discussed NIJ's pioneering work with booked arrestees. Particularly over the past 3 years, NIDA has been active in sponsoring studies aimed at identifying, gaining access to, and interviewing individuals at high risk for substance abuse. DC*MADS was designed to develop prototype methodologies in the Washington, D.C., area for replication and use in other metropolitan areas throughout the country. High-risk groups in the study include the homeless and transient populations, school dropouts, juvenile and adult offenders, and the institutionalized. NIDA intends to publish methodological and substantive reports in 1993 when the component studies are completed, describing the various procedures adopted in the field experiments, the success levels achieved, and resultant drug use findings. It is premature to comment on whether the developed methodologies have been successful in meeting study objectives.

Final cost figures are also not yet available for replicating each of the study components in metropolitan areas across the country. However, the proposed 3-year Washington, D.C., area total budgets submitted to the Office of Management and Budget in September 1990 were sizable. The homeless and transient study was projected to cost $883,628; the school dropout study, $576,033; the juvenile offender study, $480,260; the adult criminal offender study, $577,550; and the institutionalized study, $673,662. Transference to other metropolitan areas is certainly going to be a function of study costs. High replication costs are likely to preclude conducting such surveys in all but a few geographic areas.

NIDA also funded a grant award in fiscal year 1992 to the University of Michigan's Monitoring the Future investigators aimed at following up a national cohort of 8th and 10th graders every 2 years to further learn about the drug use of school dropouts. The sampling design in this 5-year study features an oversampling procedure to ensure the inclusion of students at high risk of dropping out of school. The goal is to locate them and have them respond to a mailed questionnaire. It is premature to assess the effectiveness of this study. The direct costs range from approximately $319,000 in the first year of the grant to $619,000 in the fifth year.

Gaining accurate data on multiple high-risk subgroups of the population becomes particularly important when there is a need to answer such questions as, What are the cocaine and heroin prevalence rates in the United States? How do these rates differ among the homeless, the institutionalized, and the criminal population? Have there been declines in the rates of use among frequent users?

To more effectively answer such questions, further work needs to be conducted on developing and field-testing methods for gaining access to high-risk groups, determining the validity and costs of various data gathering techniques, devising procedures to prevent duplicative counts (for example, a homeless person at one point may become institutionalized at another point), and defining strategies by which to ascertain subgroup population drug use estimates.

The Senate Committee on the Judiciary and Office of National Drug Control Policy sought to estimate the number of hard-core and heavy cocaine users through secondary analyses of existing data bases. Ethnographic street studies have also been incorporated in high-risk group prevalence estimation efforts, as have nominative techniques and a wide range of traditional operations research procedures, involving both static and dynamic models (for example, synthetic estimation, multiple-capture, system dynamics). This type of work is still in its early stages of development with respect to drug use, requiring much more elaboration and specificity, but it is certainly worthy of continued attention and funding.

Estimating drug prevalence rates and trends among all segments of the population is important. This information is valuable for determining the breadth of the nation's drug problem, the extent of treatment needs, and the success of prevention policies and programs. Particular attention should be focused on determining the drug usage patterns of high-risk individuals, given the association between drug use and the transmission of the human immunosuppressive virus, a variety of serious health disorders, delinquency, suicide, unwanted pregnancies, abnormal fetal development, and motor vehicle accidents.

Therefore, we recommend that the Secretary of Health and Human Services conduct a systematic program for the study of drug prevalence rates among underrepresented, high-risk groups. It is not sufficient for agencies to engage ad hoc in singular studies of specific high-risk groups. Given the impingement of these groups on the health care delivery system, policymakers and health officials must have comprehensive data bases from which to plan needed prevention and intervention strategies.

Agency Comments and Our Response

Issue: Hair Testing

NIDA Comments

NIDA officials expressed mixed views concerning the appropriateness of hair testing for use in self-report validation studies. Critics thought that an appropriate level of scientific precision has not yet been fully achieved and that the inclusion of a hair-testing component in NHSDA might depress overall study response rates. They believed that it would be useful to consider additional confirmatory measures in determining the validity of self-reports.

GAO Response

We believe that objective tests offer the best alternative for assessing the validity of self-reports. Our review of the state of the art (both domestically and abroad) suggests that the hair analysis technique can be used, with acceptable accuracy in self-report validation surveys, to identify individuals' prior use of various illicit substances. Hair analysis has a greater detection period than urinalysis and offers the opportunity to provide a historical record of drug consumption. NIDA's Division of Epidemiology and Prevention Research has even recommended its adoption in NHSDA.

While we recognize that further scientific precision is warranted before hair testing can be effectively used in individual cases of employment testing and criminal prosecution, there is no reason not to explore the utility of the hair analysis technique in anonymous, survey research field trials aimed at validating the self-report methodology. The degree of false positives resulting from passive exposure in a general population is not expected to be extensive; the Federal Bureau of Investigation laboratory has developed an effective washing procedure to remove environmental cocaine contamination; and hair treatments have not generally been shown to remove all traces of the drug from the hair.

In order to avoid the possibility of depressing NHSDA overall response rates, we suggest conducting a separate study of the household population to determine comparative drug use rates obtained through self-report and hair analysis. There is no evidence to suggest that such a separate study would have detrimental effects on subsequent NHSDA response rates. The extent of willingness to provide hair samples, given monetary incentives, could of course be documented as part of the trial.

Other objective confirmatory tests—typically relating self-reports of drug use to clinical records, polygraph scores, and arrest charges—generally do not apply to the household population. Given the detection limitations of urinalysis, and the experimental nature of saliva testing, hair analysis seems the most appropriate objective technique to pursue at this point in time for determining the validity of self-reported drug use. Continued drug use correlational analyses across multiple self-report-based studies are also encouraged.

Issue: Frequency of NHSDA Administration

SAMHSA Comments

SAMHSA has been considering a range of alternatives regarding the frequency with which NHSDA is administered. While one of those alternatives involves conducting NHSDA biennially, SAMHSA officials have also cited several reasons for continuing the survey annually: (1) yearly data collection permits the rapid identification of changing national drug use patterns, (2) the collection of annual data reduces subsequent start-up costs, and (3) the opportunity for continued employment helps maintain an experienced cadre of survey interviewers.

GAO Response

We believe the benefits of drug use measurement improvement projects and special studies of hidden, high-risk population groups, supported with resources shifted from annual NHSDA and HSSS surveys, outweigh the gains to be made by the yearly collection of household and high school senior data, especially given the generally minimal variation in drug use rates found to occur between survey administrations. But we realize that the chance of missing a significant increase is always there; therefore, we have included in our recommendation to the Congress a provision authorizing the Secretary of Health and Human Services to conduct special off-cycle national data collections when there is evidence supporting a potentially sizable increase in the drug use rate. Such evidence could come, for example, from other data-gathering efforts such as DUF, the Drug Abuse Warning Network (DAWN, based on emergency room and medical examiner reports), NIDA's Community Epidemiology Work Group (CEWG, which meets semi-annually to discuss local drug patterns and trends, street costs, and purity levels), as well as a variety of additional sources.

While the ongoing collection of NHSDA yearly data helps minimize start-up costs, an internal working document of the Alcohol, Drug Abuse, and Mental Health Administration demonstrates sizable cost saving to be achieved through biennial, rather than yearly, administration of the survey. For fiscal year 1993, NIDA staff estimated the cost saving to be $9 million.

The same working document discusses the issue of hiring experienced staff for a biennial administration of NHSDA. The working group's conclusion is that while some difficulty will be incurred, competent staff have always been hired in the past when the survey was conducted every 2 to 3 years. Staff capability is thus not sufficient reason for conducting NHSDA every year.

Issue: Generalizability of the DUF Data

NIJ Comments

NIJ officials disagreed with our conclusion about the ability to generalize from the DUF data. They claim that the DUF sample is at least representative of the larger universe of arrestees booked for serious crimes in the specific locations (or catchment areas) where the DUF study is operational.

GAO Response

The NIJ conclusion that DUF is representative is based on a comparison of DUF and UCR arrestee charges, for a period of up to 3 years, in specified DUF locations.[6] But our analysis of the same data shows several marked differences between DUF and UCR data on the distribution of "core" (or serious) arrest charges. For example, in Washington, D.C., according to the NIJ contractor's report, 33.6 percent of the cumulative male DUF arrestees were charged with property-related crimes, much higher than the 19.1 percent in the UCR data base. In Detroit, 39.9 percent of the cumulative male DUF arrestees were charged with drug sale or possession, again much higher than the 18.3 percent in the UCR data base. In Houston, 9.5 percent of the male DUF arrestees were charged with other violent crimes, less than half the 22.4-percent rate in the UCR data base. The NIJ contractor's study, in fact, also concluded, as we did, that misdemeanor charges constituted a "substantial portion" of the UCR data base but only a "small portion" of the DUF sample and that "booked arrestees are not representative of the totality of arrestees in the city or county." Thus, we question the study's conclusion that the DUF data base is representative of booked arrestees and see no need to modify our observations.

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[6] This comparison is reported in J. Chaiken and M. Chaiken, "Analysis of the Drug Use Forecasting (DUF) Sample of Adult Arrestees," report to the National Institute of Justice, Lincoln, Mass., October 1992.

Issue: Methodological Standardization

NIJ Comments

NIJ officials have claimed that methodological standardization across sites is not an important concern since the primary purpose of DUF has been to collect data useful to local law enforcement agencies.

GAO Response

Standardization is an important concern whenever there is a need to aggregate data across multiple reporting facilities. In the DUF third and fourth quarter reports of 1988, NIJ states that the purpose of the DUF program is to also include two national objectives: “to provide national-level estimates of illicit drug use among offenders” and “to track and forecast national drug use trends.” DUF data have also been aggregated and reported by region in the 1988 DUF annual report. Lack of standardization in the data collection procedure among sites can bias both nationally and regionally reported data. Even at the local city or county level, the aggregation of data across two or three booking facilities has been necessary. If these facilities were not to use the same standardized criteria, bias could occur.

Cost Estimates for Hair Analysis

These cost estimates were obtained from a commercial laboratory currently conducting hair testing. We had initially sought to obtain cost estimates from multiple research laboratories, but they declined participation in general population surveys.

Conducting Screening Tests and GC/MS Confirmatory Tests

Traditionally, confirmatory tests are applied in instances in which drug screens have demonstrated positive results. Four drug types are considered in this cost estimate: cocaine, opiates, amphetamines, and PCP.

Item	Cost
Drug testing (2,000 subjects X $43 per subject)	$86,000
Subject incentive payments (2,000 subjects X $30 per subject)	60,000
Shipping (20 mailings at 100 subject specimens per mailing X $15 per mailing)	300
Total	$146,300

Conducting GC/MS Confirmatory Tests on All Subjects

This alternative permits testing of all subjects using highly sensitive GC/MS confirmatory testing procedures. The less sensitive screening tests are not applied. Since this methodology results in higher costs, only two drug types are considered here: cocaine and opiates.

Item	Cost
Drug testing (2,000 subjects X 2 drug tests per person X $45 per drug test)	$180,000
Subject incentive payments (2,000 subjects X $30 per person)	60,000

Shipping (20 mailings X $15 per mailing)	300
Total	$240,300

Major Contributors to This Report

Program Evaluation and Methodology Division

Frederick V. Mulhauser, Assistant Director
Jared A. Hermalin, Project Manager
Harry M. Conley, Sampling Consultant
Venkareddy Chennareddy, Referencer
Petre Snegireff, Research Assistant
Penny Pickett, Reports Analyst

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